ADOT Corridor Profile Studies (I-17, I-19, and I-40)
TAC Meeting 1
September 16, 2014

Agenda

1. Welcome and Introductions (ADOT)
2. TAC Role and Responsibility (ADOT)
3. Corridor Profile Overview (ADOT)
4. Literature Review Overview (AECOM)
5. Performance Framework Overview (KH)
    - Pavement Performance (AECOM)
    - Bridge Performance (AECOM)
    - Mobility Performance (URS)
    - Safety Performance (KH)
    - Freight Performance (KH)
6. Next Steps (KH)

ADOT Corridor Profile Studies (I-17, I-19, and I-40)

TAC Role and Responsibility

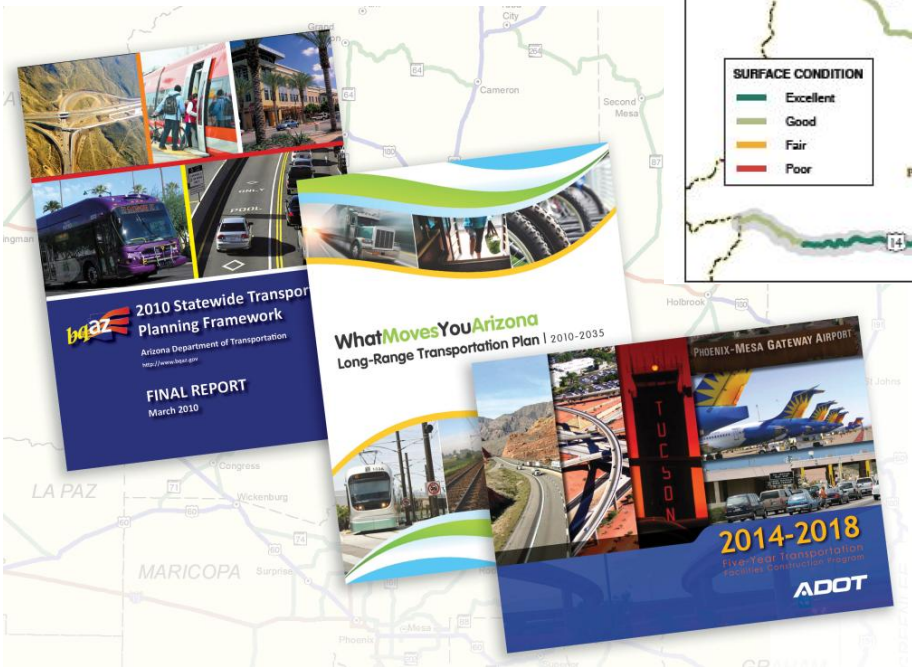
- Assist in obtaining data and relevant information
- Provide technical guidance, information, and response to issues
- Assist the project teams with technical decisions
- Maintain two-way communication with the study teams

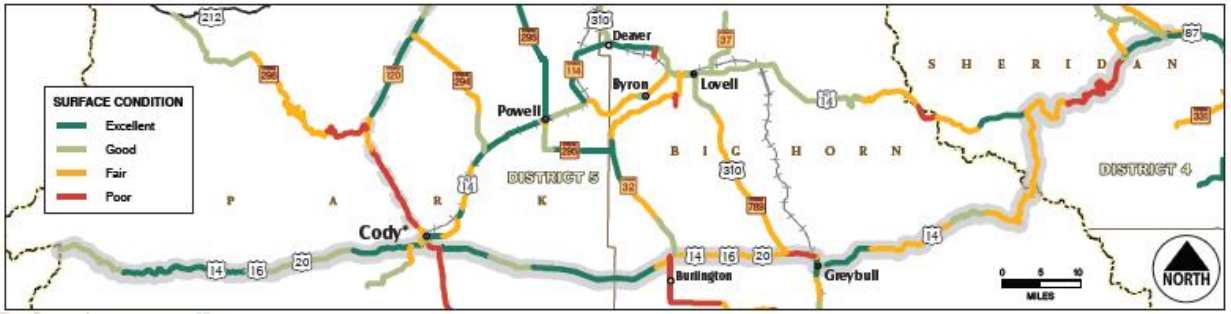
ADOT Corridor Profile Studies (I-17, I-19, and I-40)

Corridor Profile Study Overview

Corridor Profile Studies

Planning to Programming Linkage (P2P)





ADOT
ARIZONA DEPARTMENT OF TRANSPORTATION

VISIONING to PROGRAMMING

March 2011

How do transportation projects move from initial visioning stages to programming (funding for construction)?

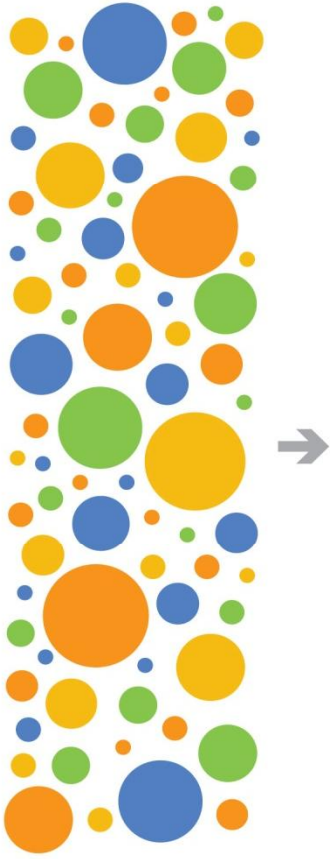
ADOT ARIZONA DEPARTMENT OF TRANSPORTATION

VISION

▼ UNIVERSE OF PROJECTS

The existing universe of projects was defined through the bqAZ Statewide Transportation Planning Framework.

www.bqAZ.gov



PLAN

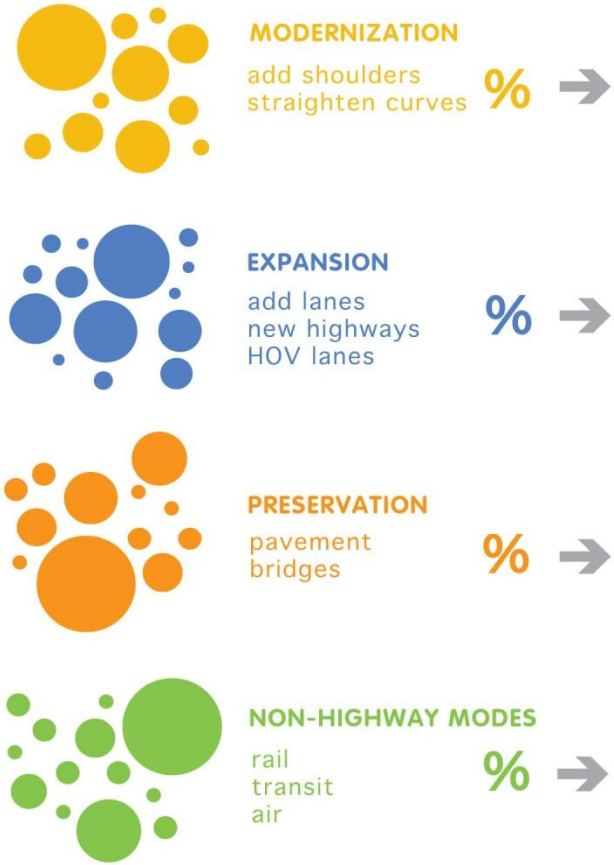
▼ PROJECT TYPE

Projects are sorted into four main project categories

$ $ PERCENTAGE OF FUNDS ▼

Goals and objectives from the Long-Range Transportation Plan are used to determine funding for projects in each category

PROJECT TYPE

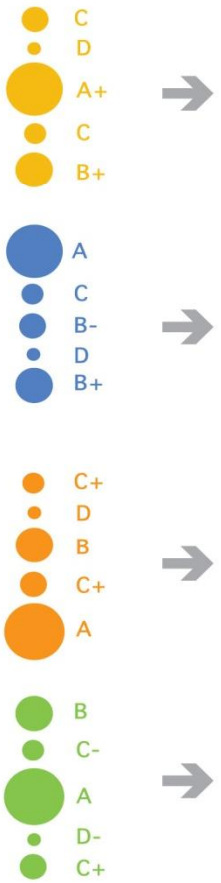


PROGRAM

▼ PERFORMANCE SCORING

Projects are scored based upon specific "Performance Measure" criteria (such as pavement condition, congestion levels, travel time)

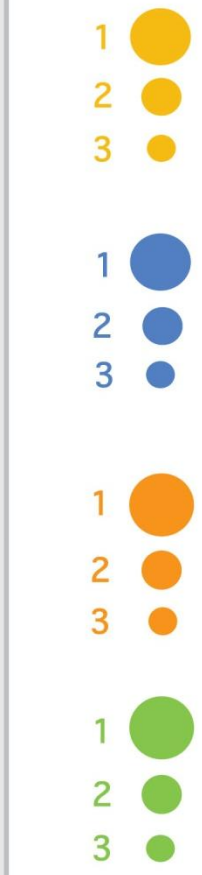
PERFORMANCE CRITERIA



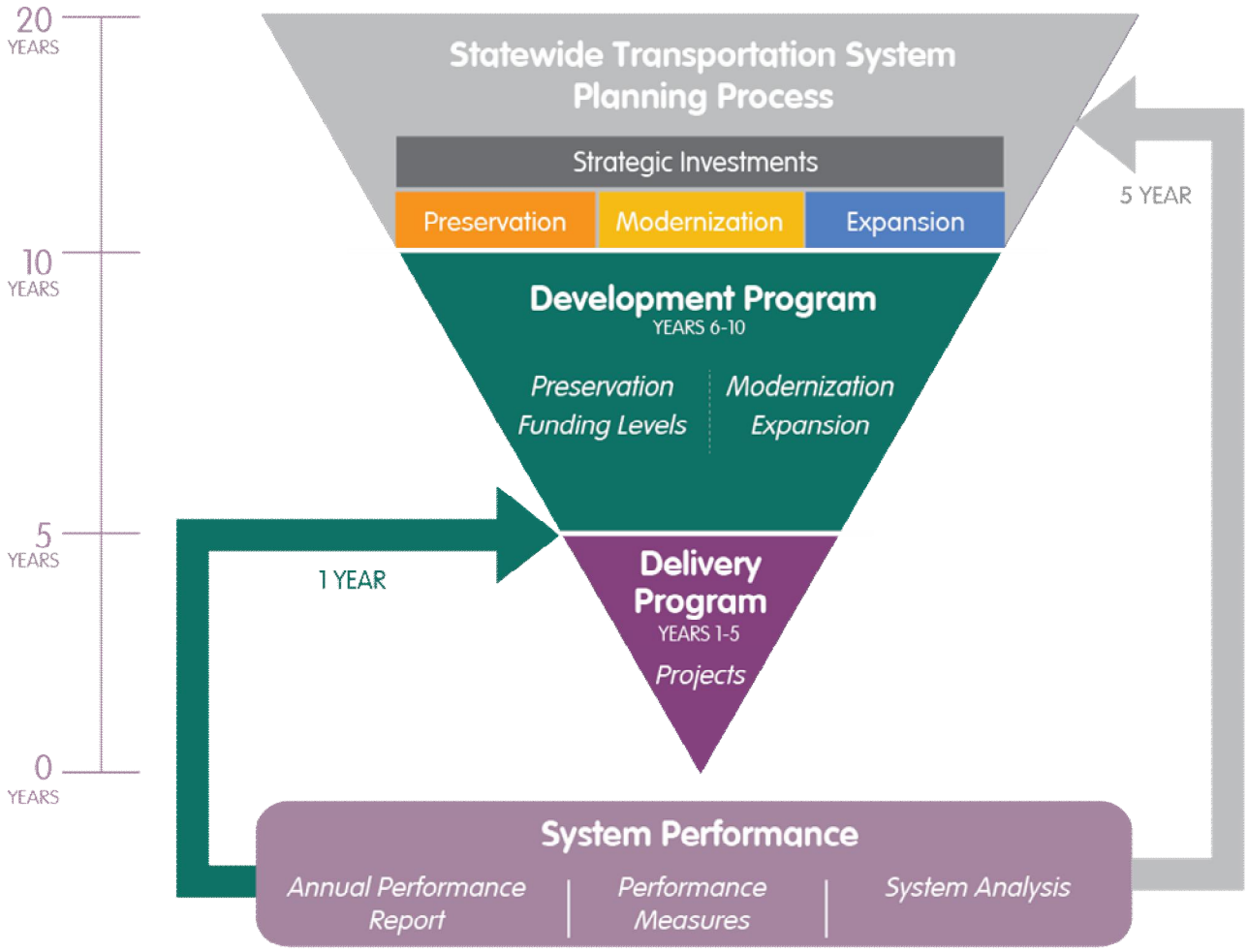
▼ PRIORITIZATION

Best performing projects are programmed to receive funding through the 5-Year Plan 1 2 3

5 - YEAR PLAN



Linking Planning to Programming



3-Year Strategy Plan

Year 1(FY14) – Initiate Planning and the 10-Year Program Plan

- ✓ Define scope and timeline for Asset Management Plan, System Performance Analysis and LRTP Update
- ✓ Implement new 10-Year Program structure
- ✓ Define methodology of System Performance Analysis

2016

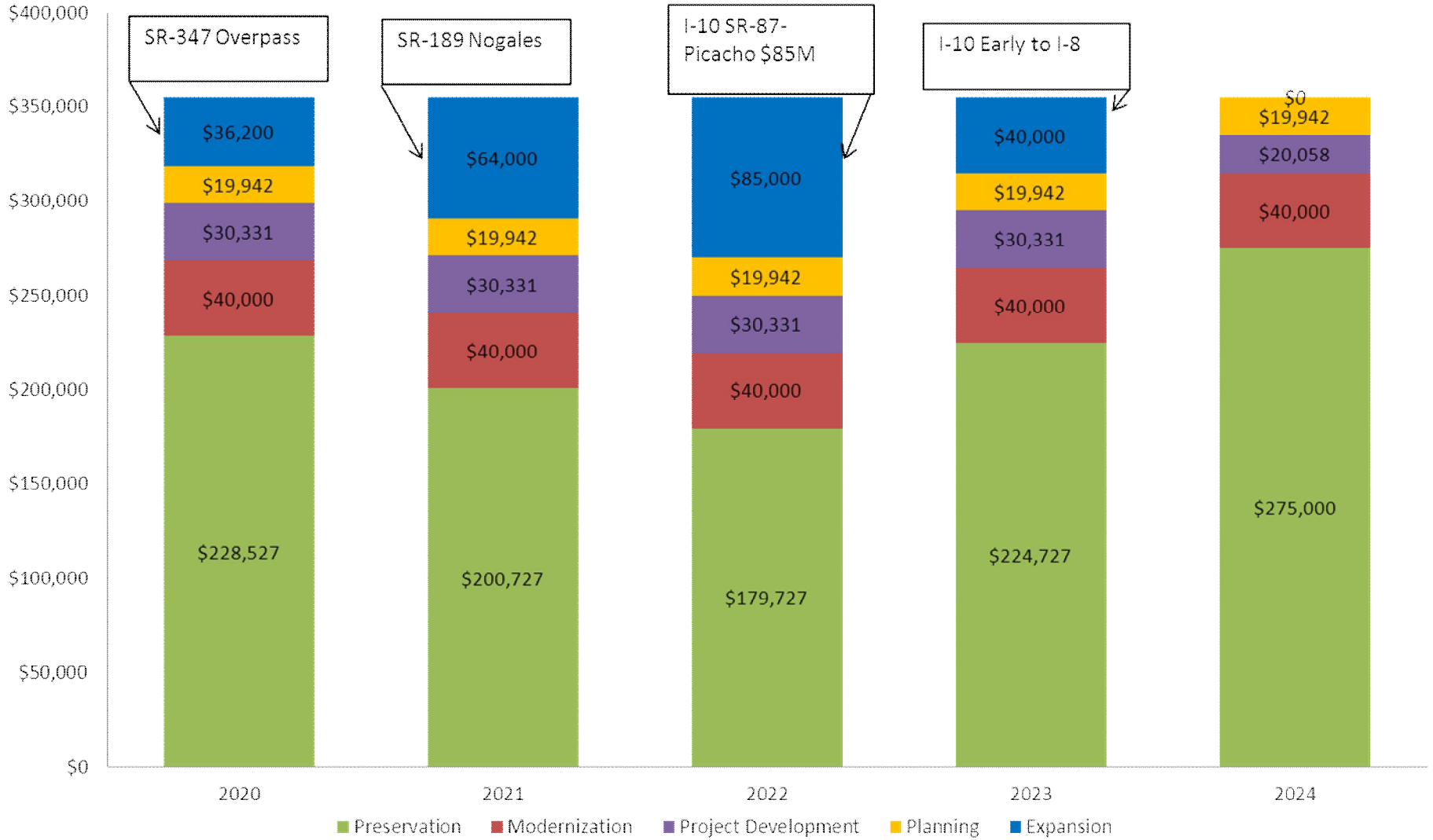
Year 2(FY15) – Implement System Performance Program

- Evaluate the current program balance among the investment categories pending plan updates
- Prepare the first System Performance Analysis Report

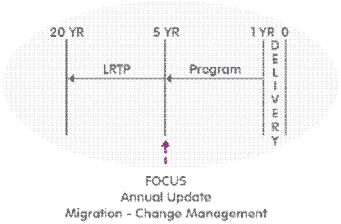
Year 3(FY16) – Update the LRTP

- Refine overall methodology for System Performance Analysis and address the identified needs in the LRTP update
- Identify Strategic Investments in the LRTP update

Development Program 2020-2024

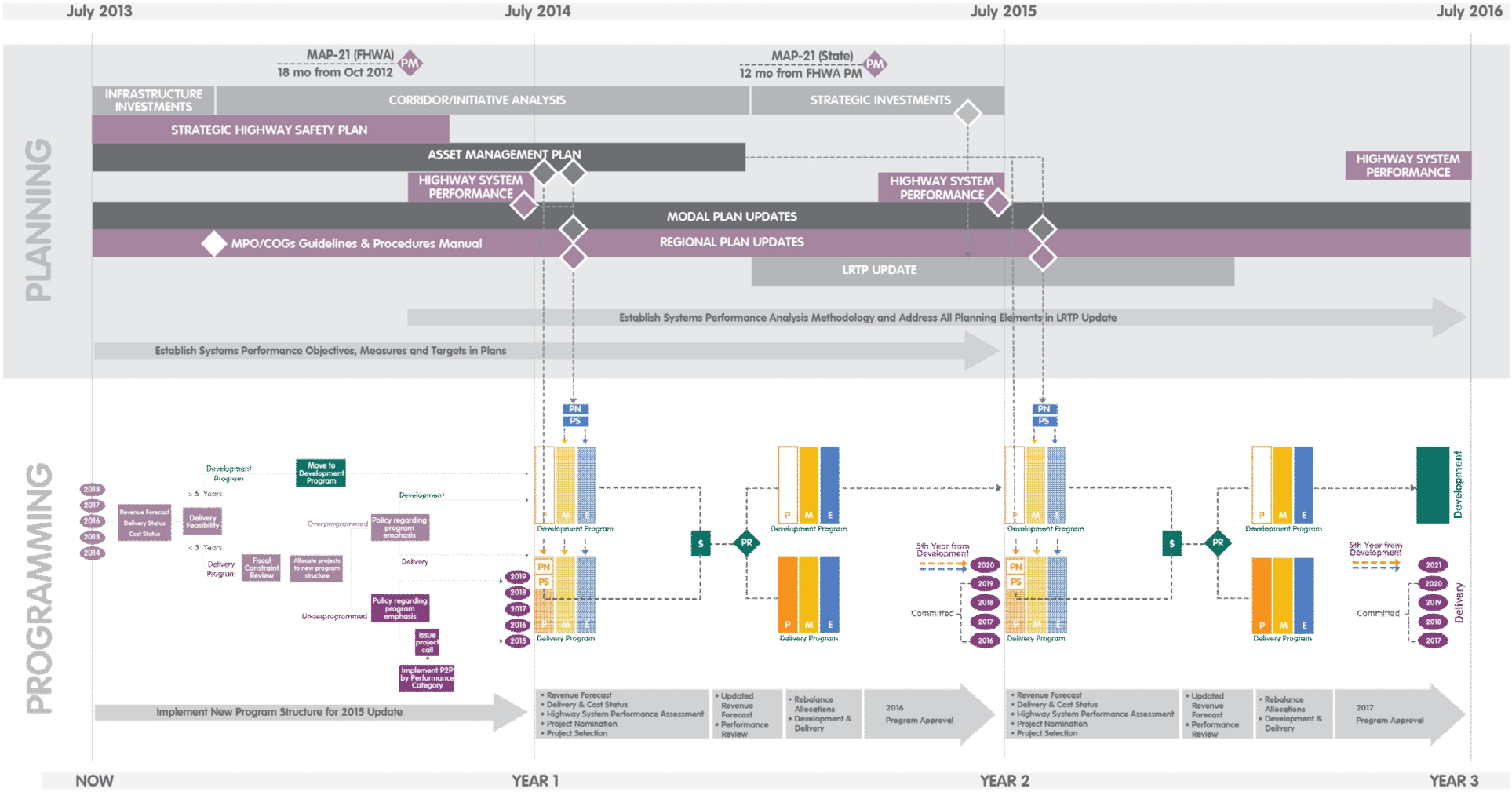


P2P Link Implementation



LEGEND

◆→	Apply performance objectives, measurements, and targets
PM	Performance Measurements
PN	Project Nomination
PS	Project Selection
PR	Performance Review
$	Revenue Update



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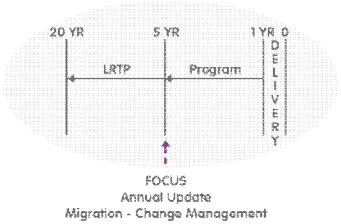

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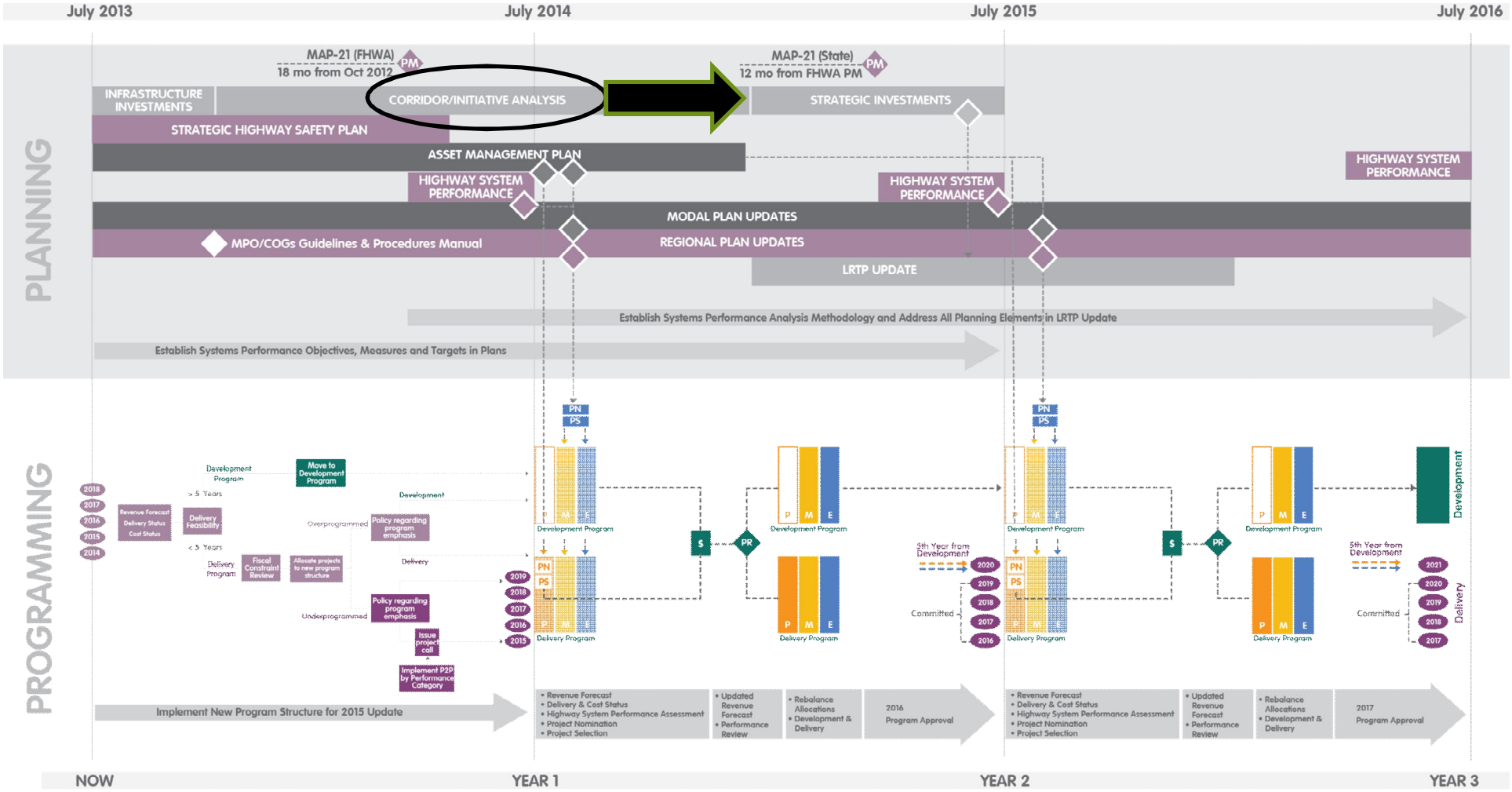
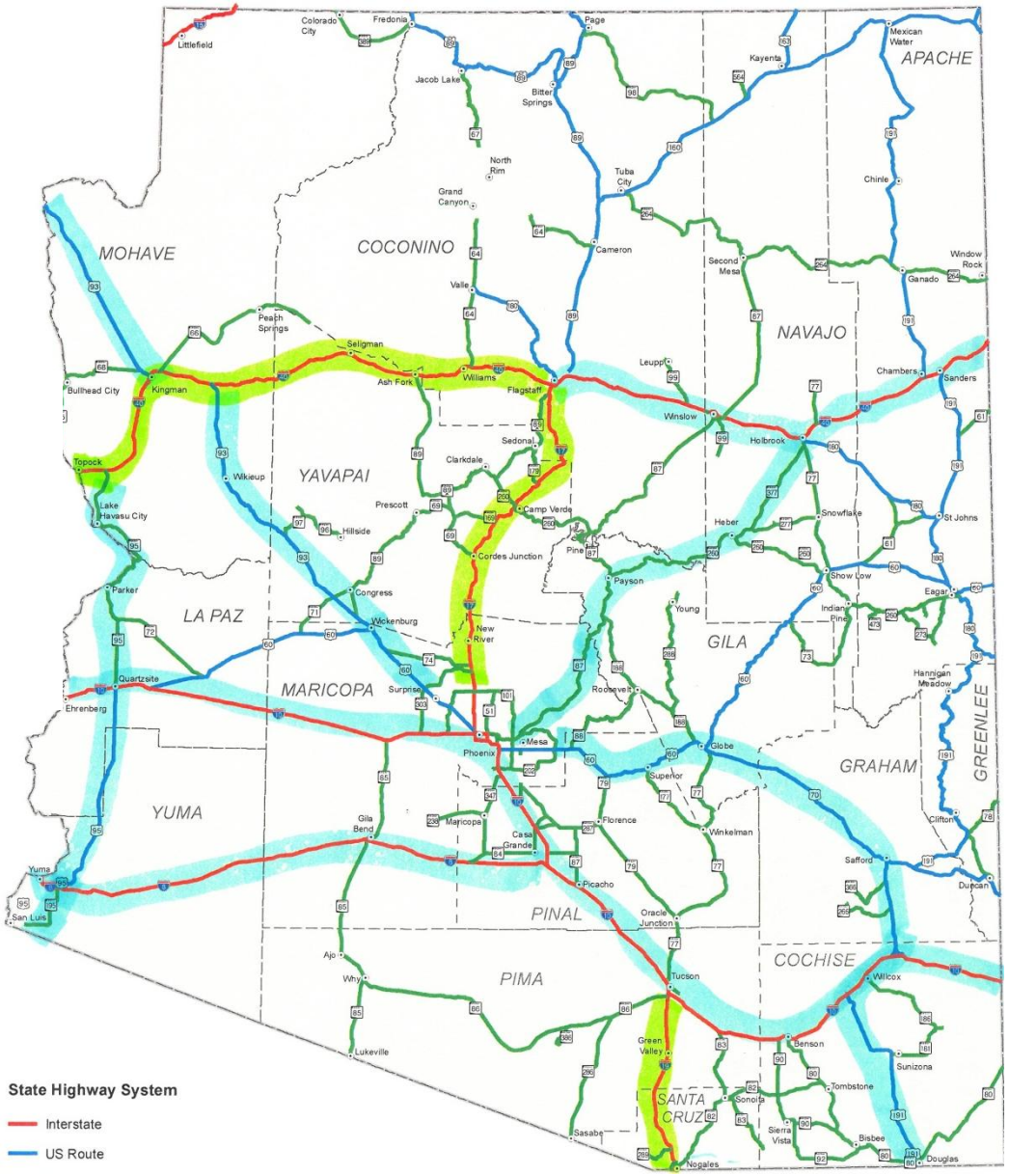


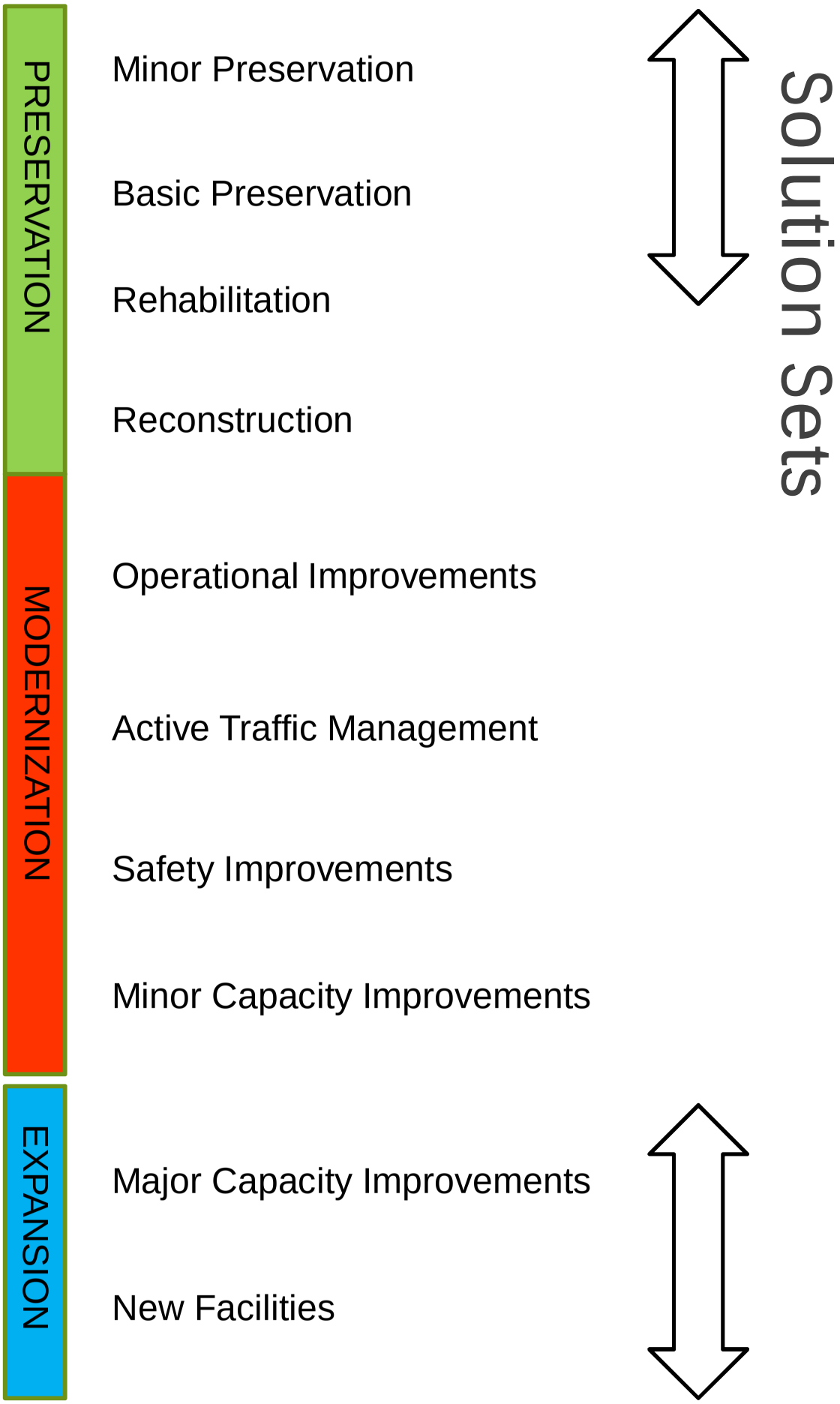
Annual Program Update

Annual Program Update

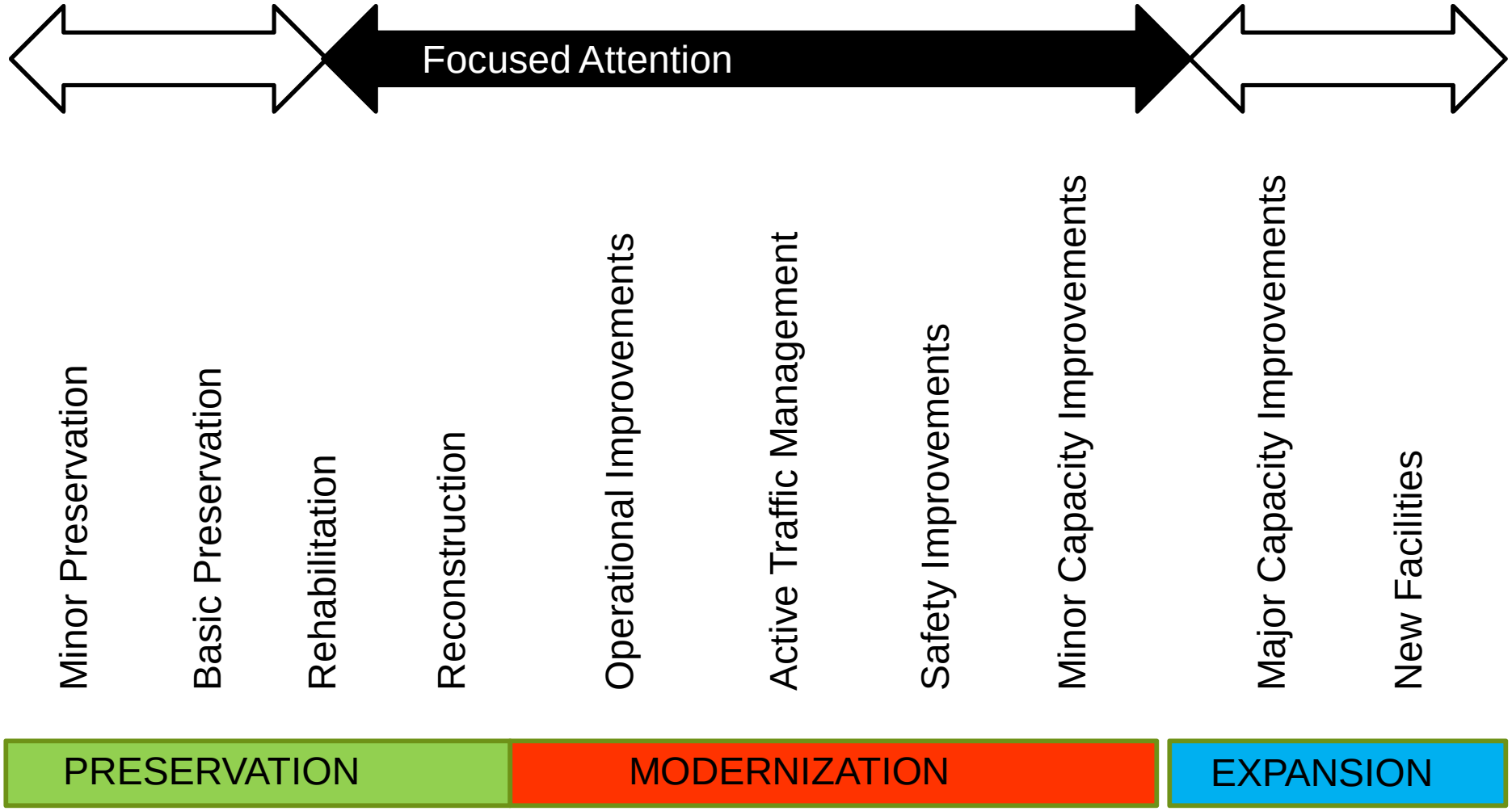
Program Organization

- 3 Year Program
- 9 Strategic Corridors
- FY15; 3-4 more studies




PRESERVATION
MODERNIZATION
EXPANSION
Minor Preservation
Basic Preservation
Rehabilitation
Reconstruction
Operational Improvements
Active Traffic Management
Safety Improvements
Minor Capacity Improvements
Major Capacity Improvements
New Facilities
Solution Sets

Solution Sets



Life Cycle Considerations

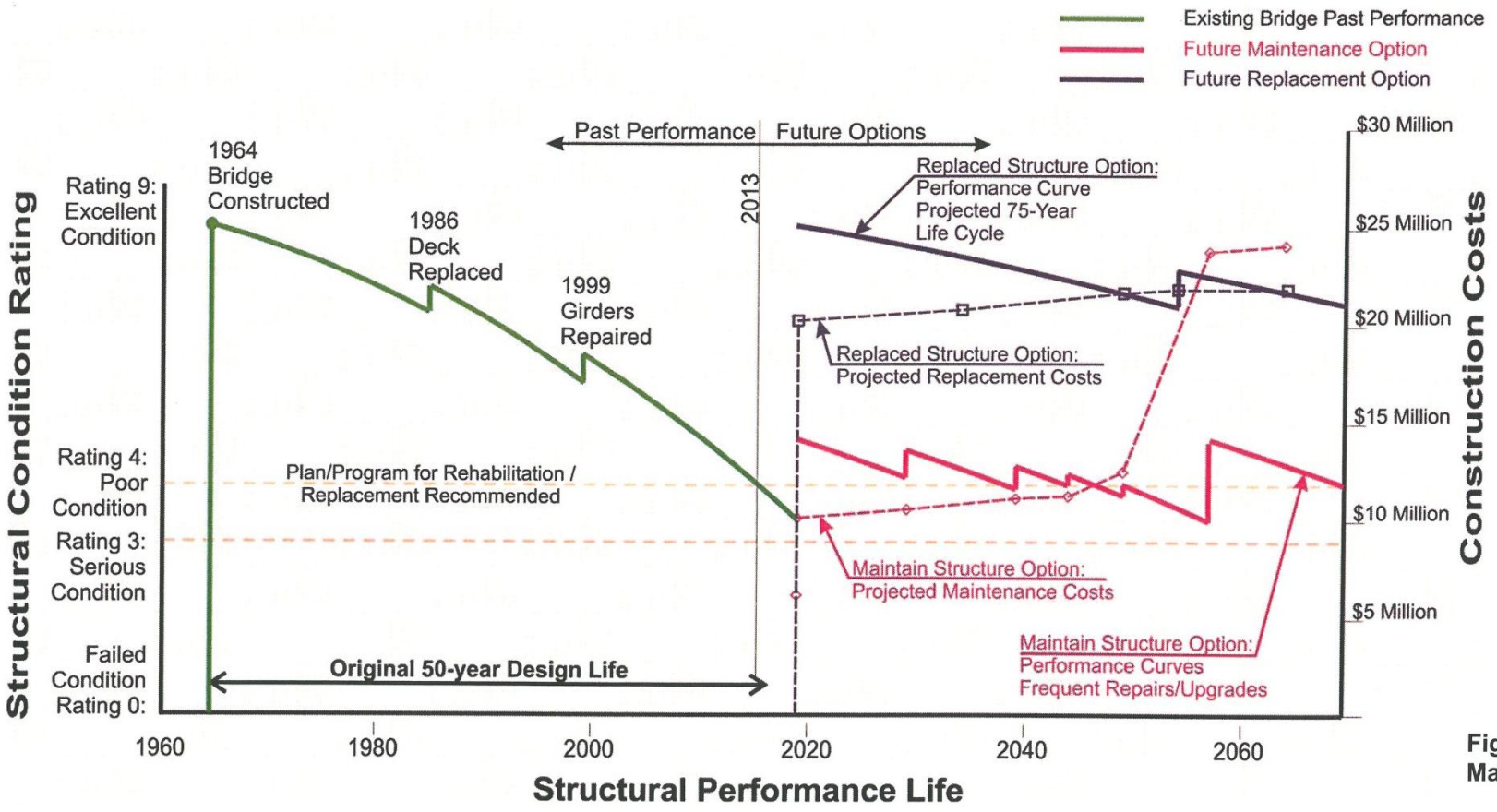
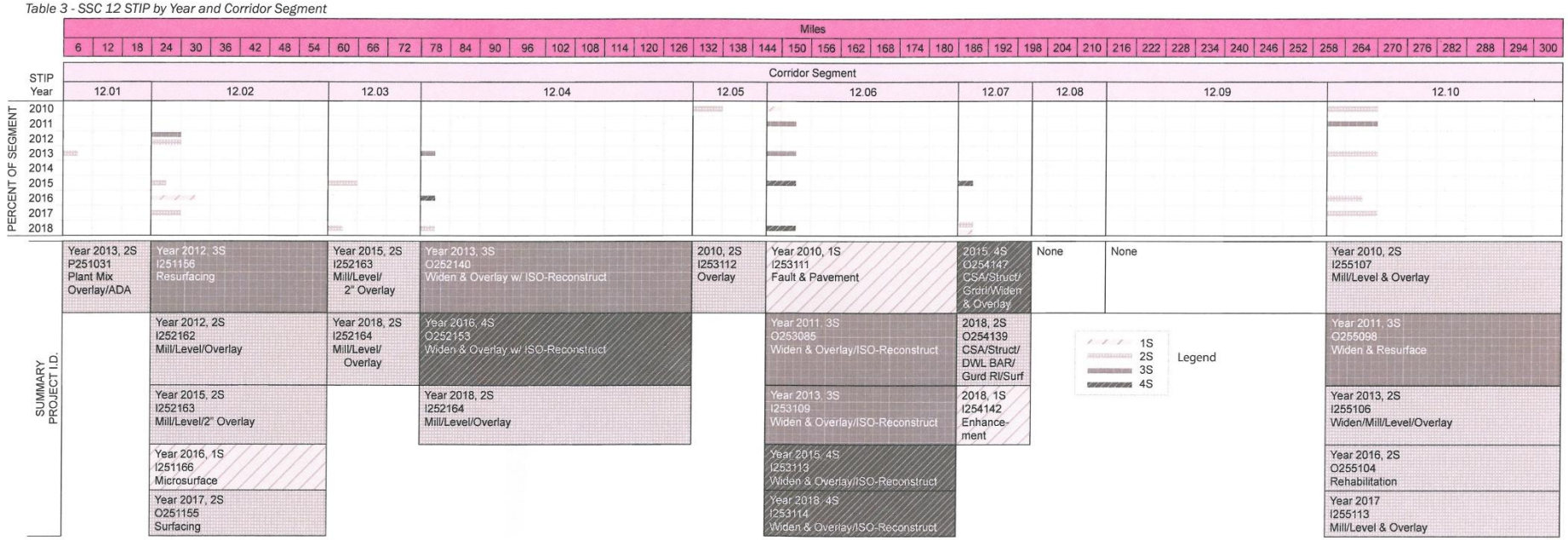


Figure 8-5: Maintenanc

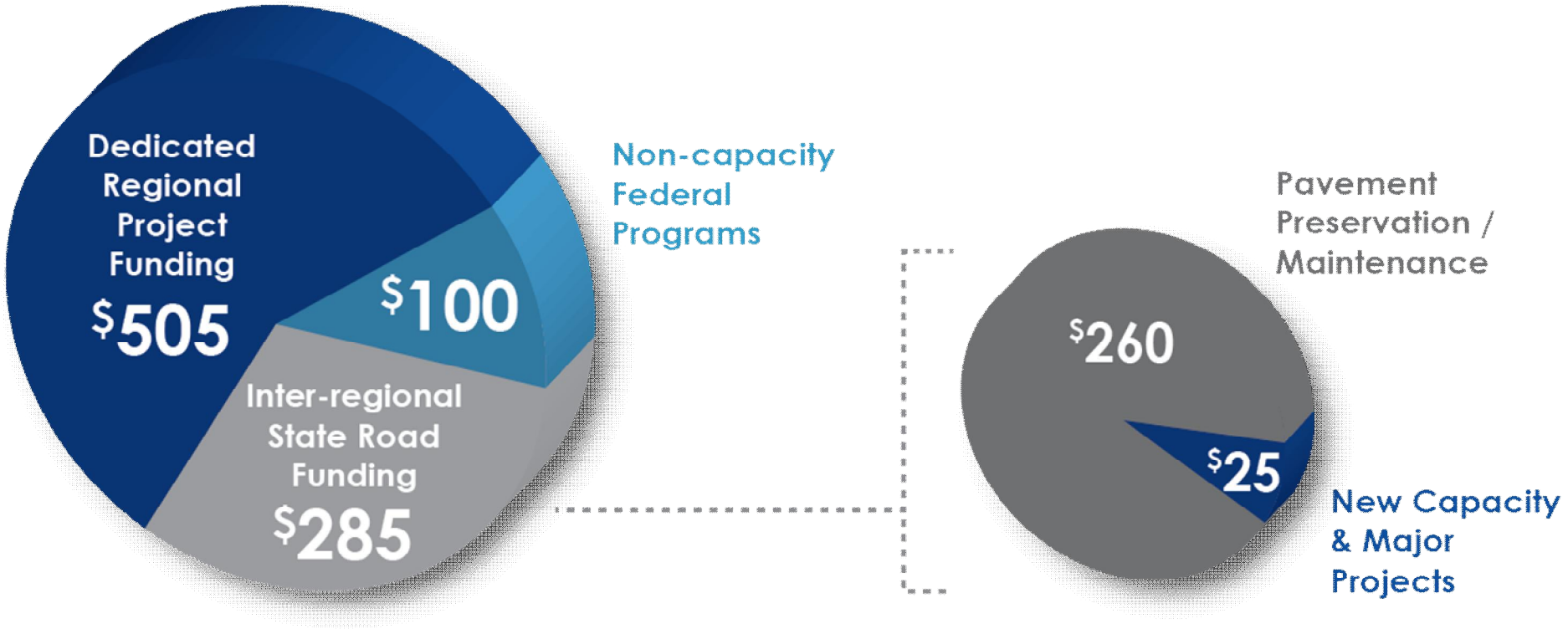
Life Cycle Considerations

Table 3 - SSC 12 STIP by Year and Corridor Segment



Average ADOT Funding Allocation

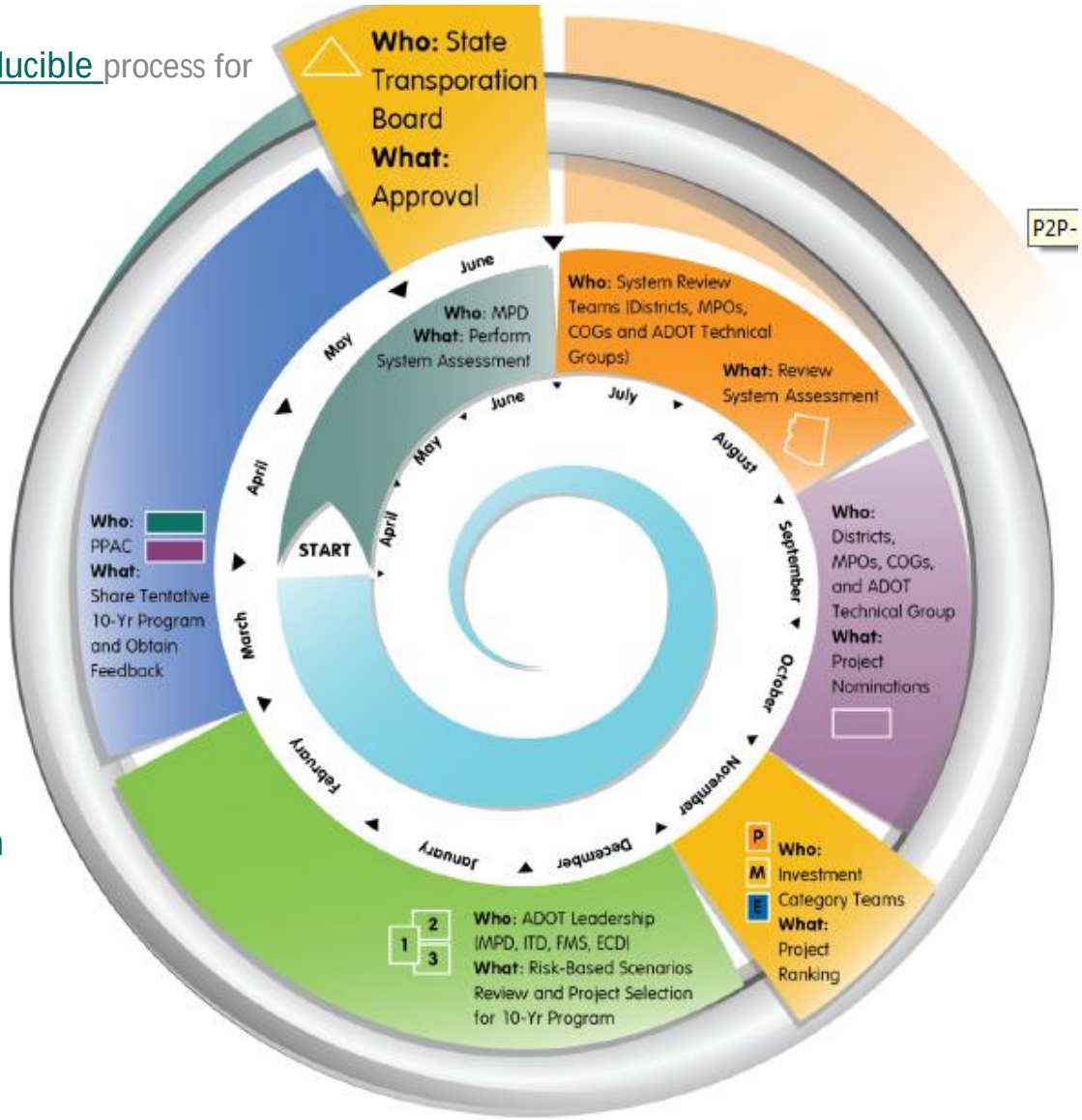
(millions of dollars)



Total $890 million/yr

P2P Link will change business practices at ADOT

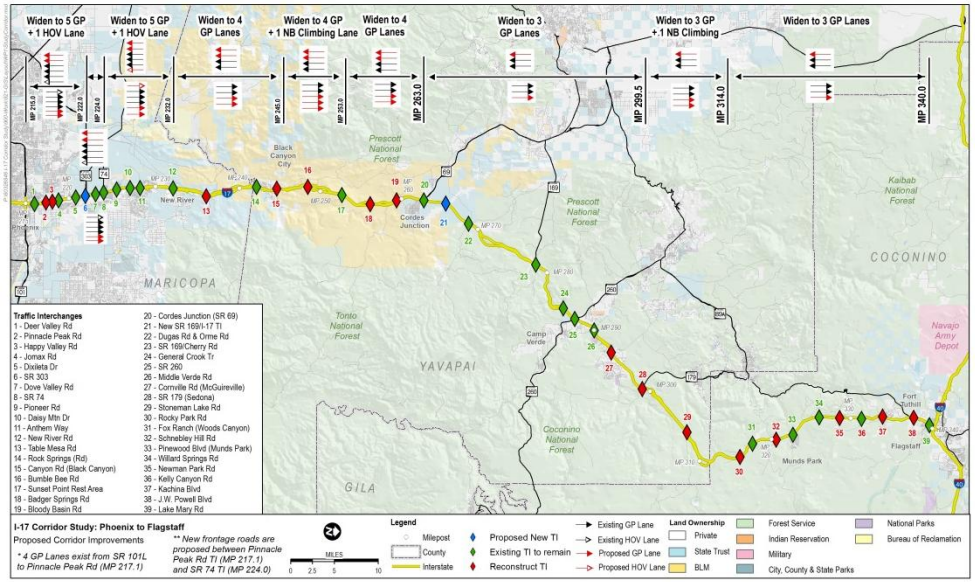
- Transparent, defensible, logical, reproducible process for programming improvements
- Truly linking planning to programming to use funds more effectively
- System performance will drive investment decision making
- Simplified program structure
- Implementation of a risk-based approach
- Assist with implementation of MAP-21



ADOT Corridor Profile Studies (I-17, I-19, and I-40)

Literature Review Overview

- Previous recommendations
- Recommendations not implemented
- Corridor plan or vision
- Did we miss something?
- Comments due on 9/23

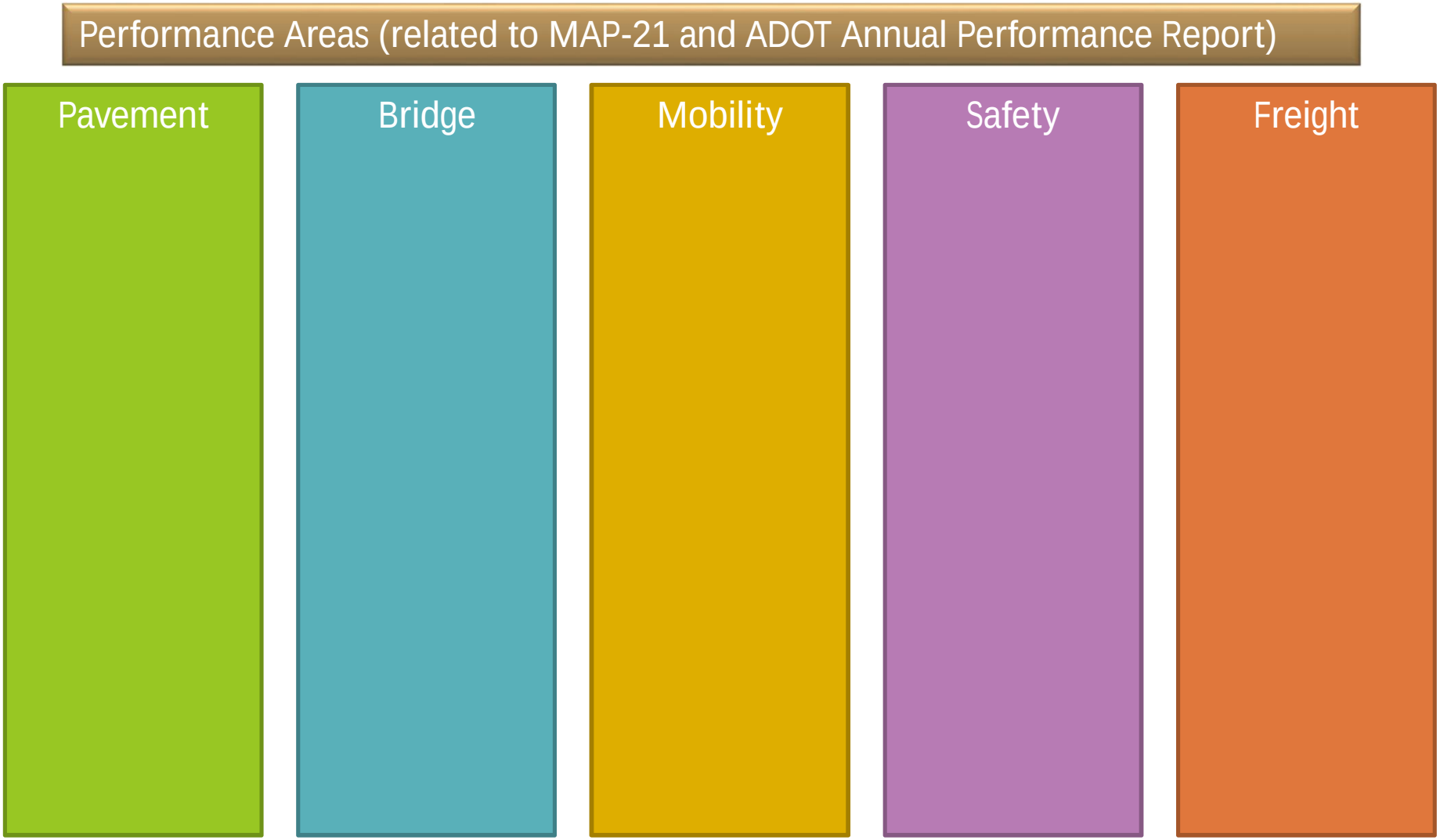


ADOT Corridor Profile Studies (I-17, I-19, and I-40)
Performance Framework Overview

Key Definitions

- Performance-Based Corridor Assessment: An assessment of corridor performance to identify investment needs, diagnose causes and solutions, and evaluate priorities within desired Performance Areas
- Performance Areas: System and Operational characteristics of strategic Importance
- Corridor Need: A deficiency in performance (target performance compared to existing performance)
- Corridor Solutions: Improvements or strategies focused on ADOT investment options of Preservation, Modernization, and Expansion
- Corridor Priorities: Solution-based projects that advance the corridor toward performance targets (candidates for the statewide P2P programing process)
- Corridor Segments: Sub-units of the total corridor based on changes in context which provide a location based analysis and flexibility in level of detail.

ADOT Corridor Profile Studies (I-17, I-19, and I-40)
Performance Framework Overview

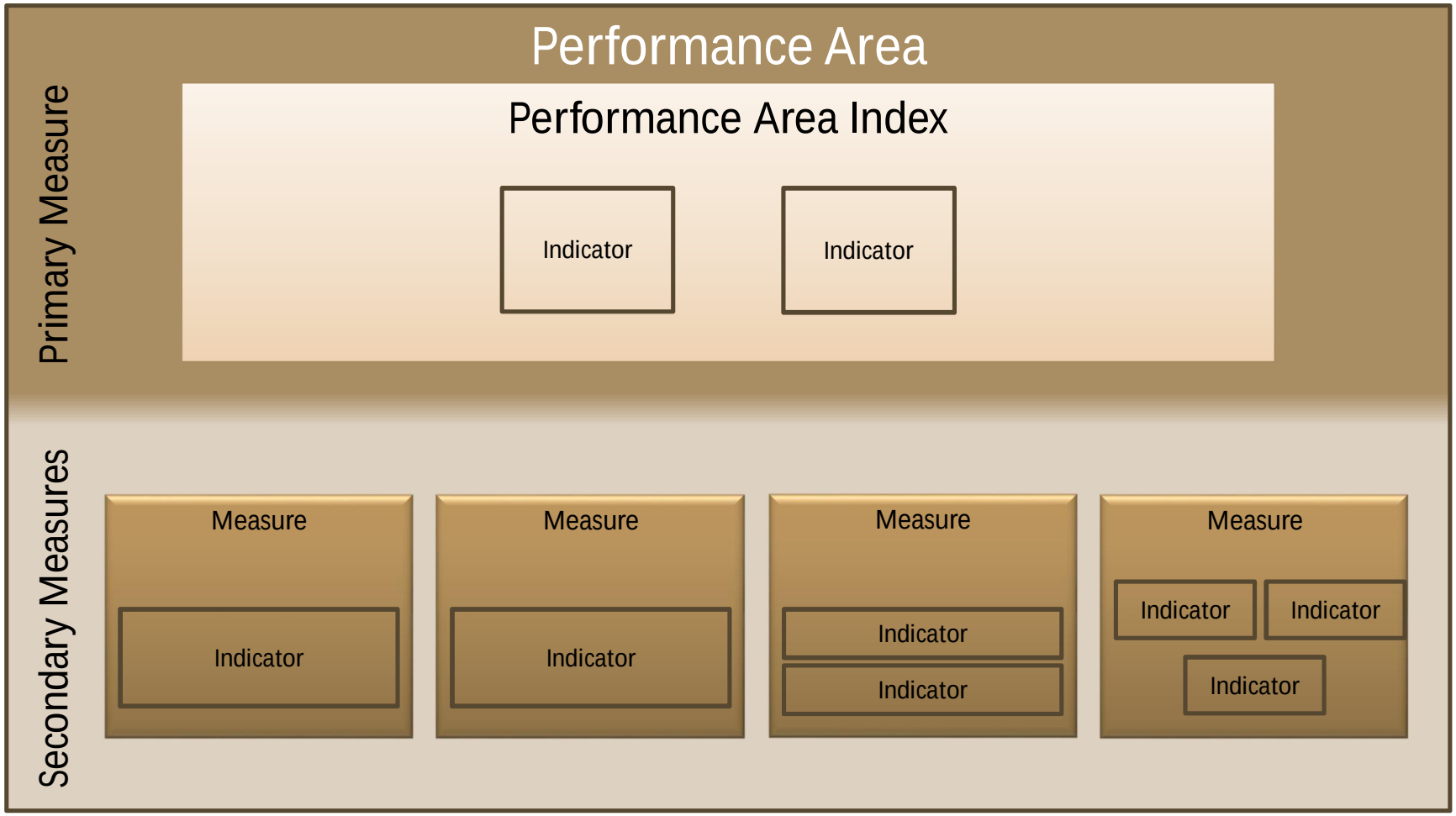


ADOT Corridor Profile Studies (I-17, I-19, and I-40)
Performance Framework Overview

Key Definitions

- Performance Framework: System of performance measures which assess corridor health and provide information to diagnose needs, solutions, and priorities
- Indicator: An existing data set or derived value which includes data relative to the transportation infrastructure. Indicators may be combined or used singularly for use as a performance measure
- Primary Measure: A Segment Performance Index which considers one or several indicators of performance to establish relative need in each of the Performance Areas
- Secondary Measure: Measures which provide additional information on characteristics and locations in the diagnosis and establishment of needs, causes/solutions, and priorities

ADOT Corridor Profile Studies (I-17, I-19, and I-40)
Performance Framework Overview

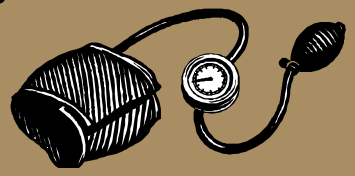
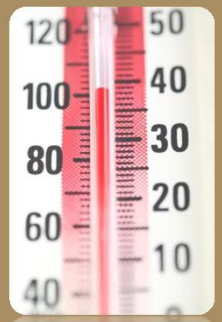


ADOT Corridor Profile Studies (I-17, I-19, and I-40)
Performance Framework Overview

Corridor and System Health

- Primary Measure used to evaluate relative health and indexed to make comparative analysis to “healthy” conditions



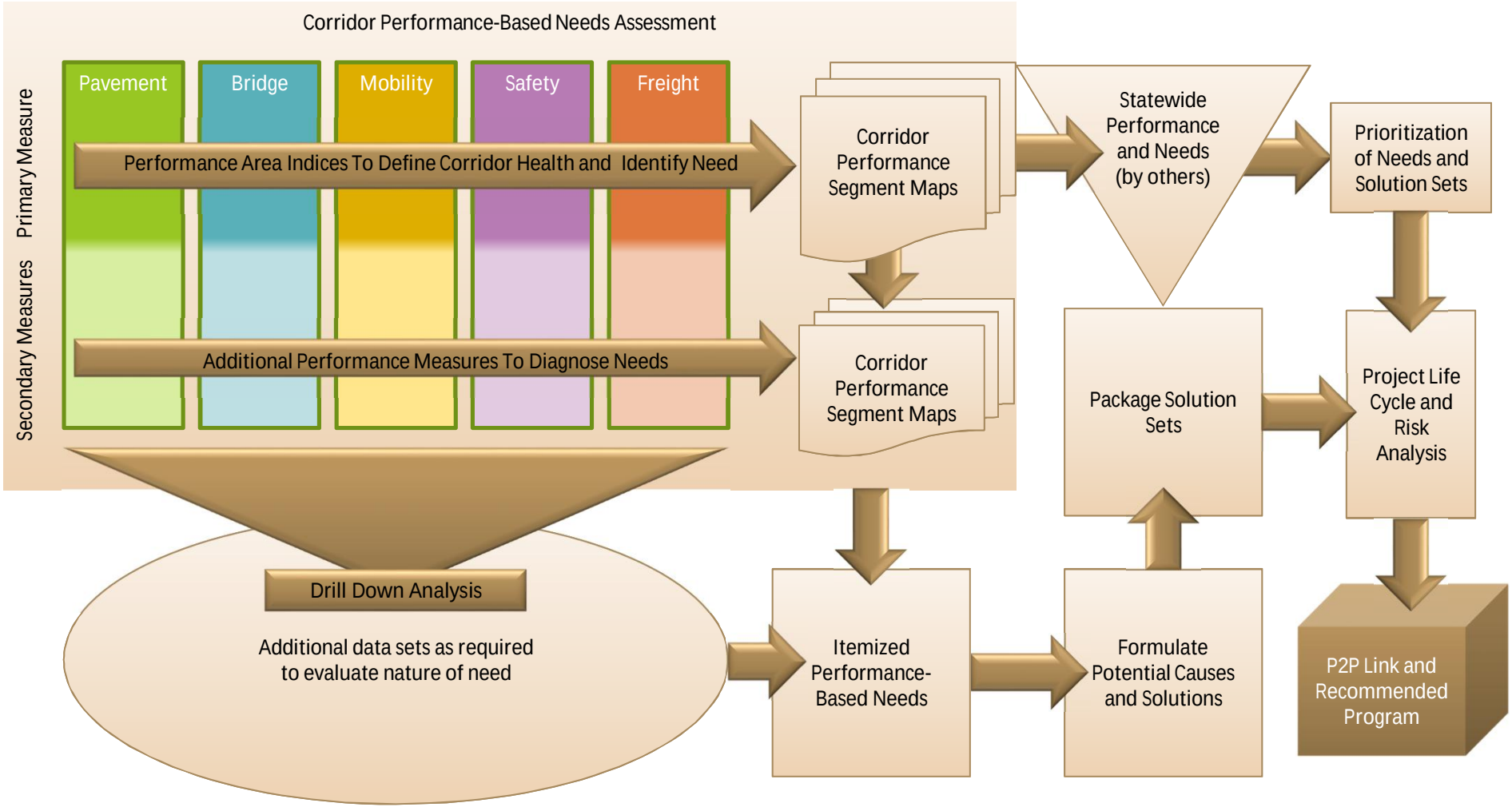
- Secondary Measures provide diagnostic information to help identify causes and potential solutions



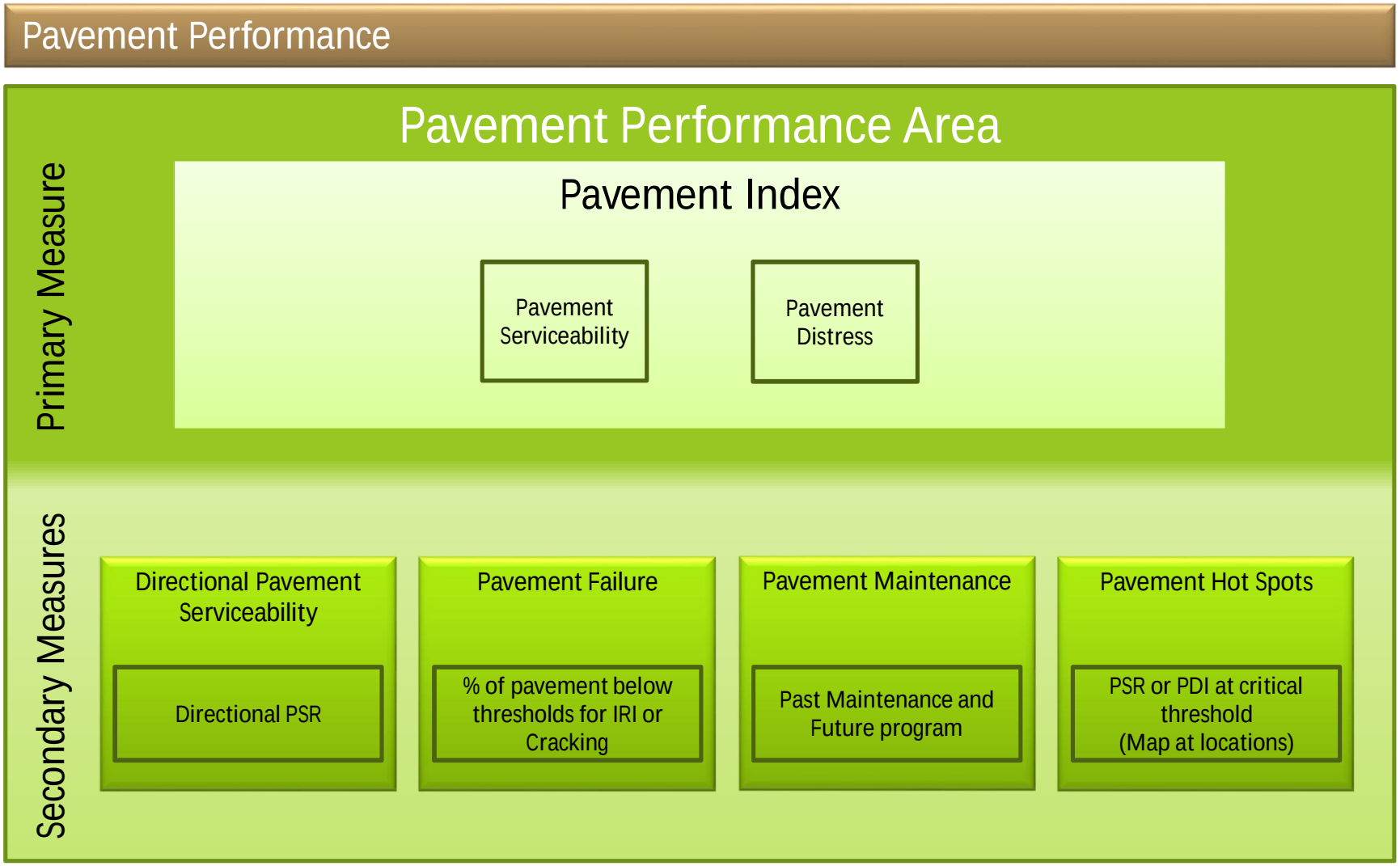
ADOT Corridor Profile Studies (I-17, I-19, and I-40)
Performance Framework Overview

Corridor and System Health Example

ADOT Corridor Profile Studies (I-17, I-19, and I-40)
Performance Framework Overview



ADOT Corridor Profile Studies (I-17, I-19, and I-40)



ADOT Corridor Profile Studies (I-17, I-19, and I-40)

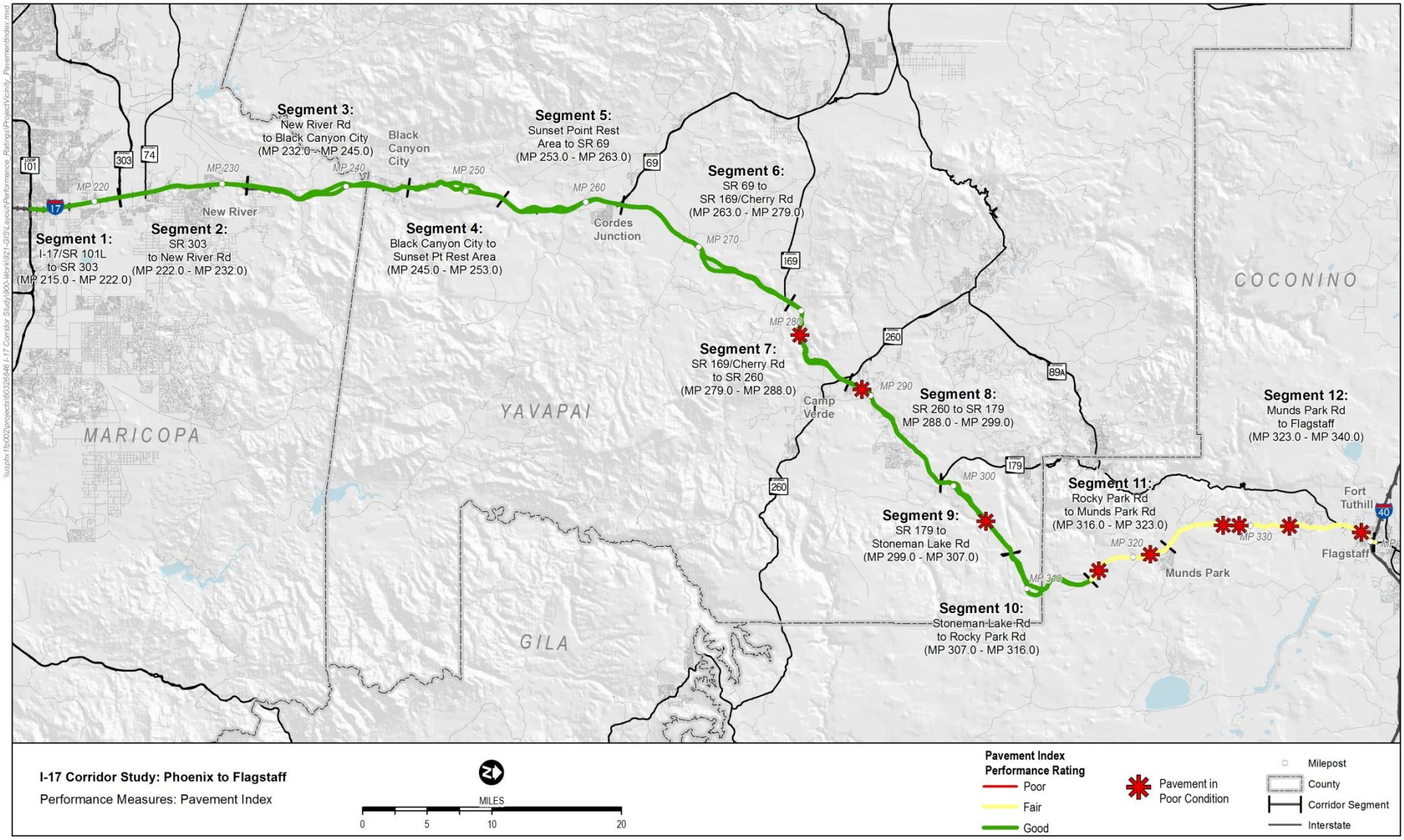
Pavement Performance

- Primary Measure: uses combination of PSR (International Roughness Index) and PDI (Cracking) to assess health of each segment
- Data Source: current ADOT pavement database
- Calculation of Pavement Index: combination of both directions of travel and weighted by # of lanes
- Pavement Index Score: Good/Fair/Poor based on performance thresholds for PSR and PDI
- Secondary Measures: will break PSR into each direction and help identify “hot spots”

I-17 Segment	Pavement Index
1	8.86
2	8.56
3	7.70
4	8.51
5	8.50
6	8.52
7	7.85
8	8.64
9	8.41
10	8.37
11	7.45
12	7.41

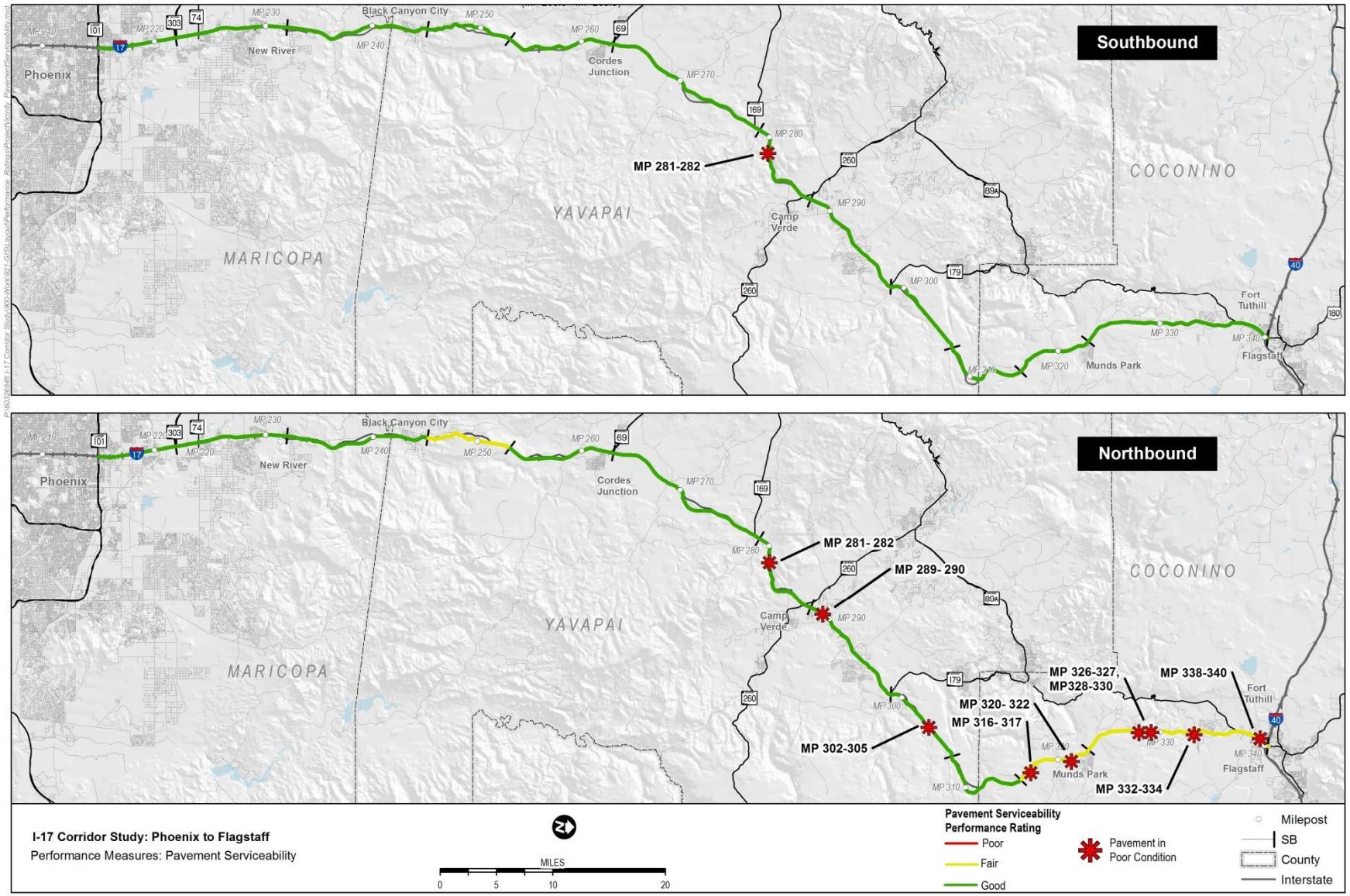
ADOT Corridor Profile Studies (I-17, I-19, and I-40)

Pavement Index Sample



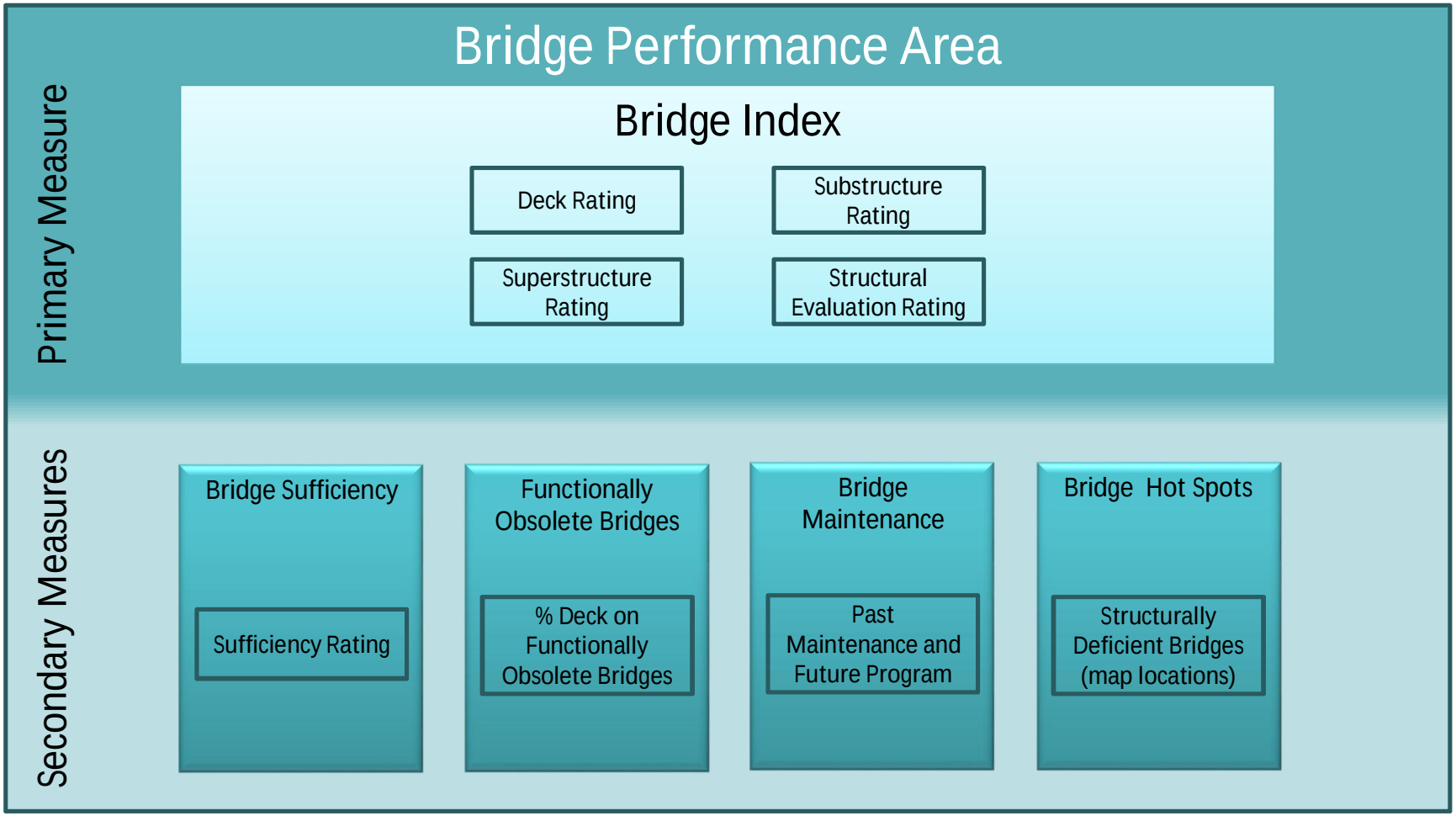
ADOT Corridor Profile Studies (I-17, I-19, and I-40)

Directional Pavement Serviceability Rating



ADOT Corridor Profile Studies (I-17, I-19, and I-40)

Bridge Performance



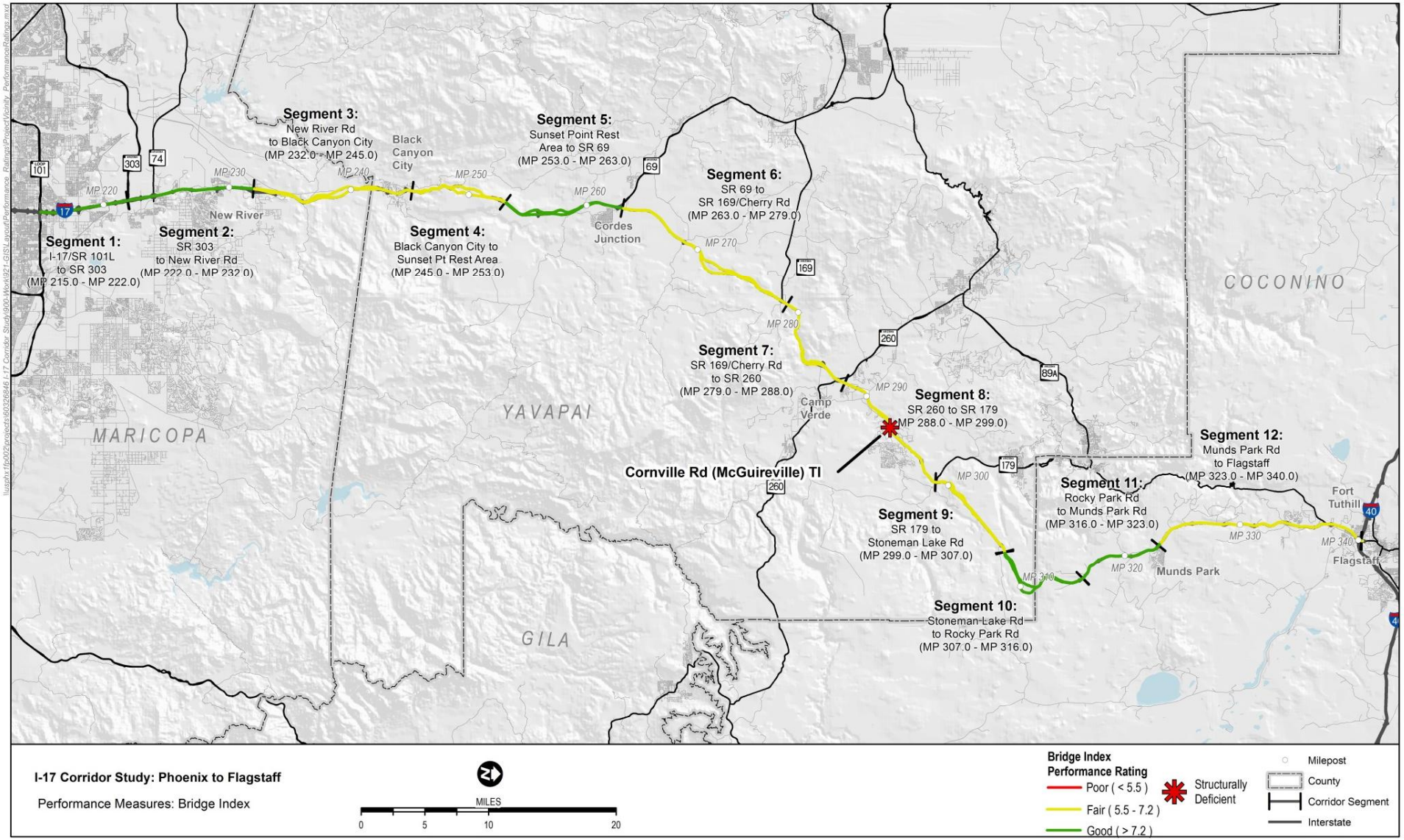
ADOT Corridor Profile Studies (I-17, I-19, and I-40)

Bridge Performance

- Primary Measure: uses 4 measures to assess health of each bridge
- Data Source: current ADOT bridge database
- Calculation of Bridge Index: calculated for each segment; weighted by deck area
- Bridge Index Score: Good/Fair/Poor based on established performance thresholds
- Secondary Measures: will provide supplemental information and identify “hot spots”

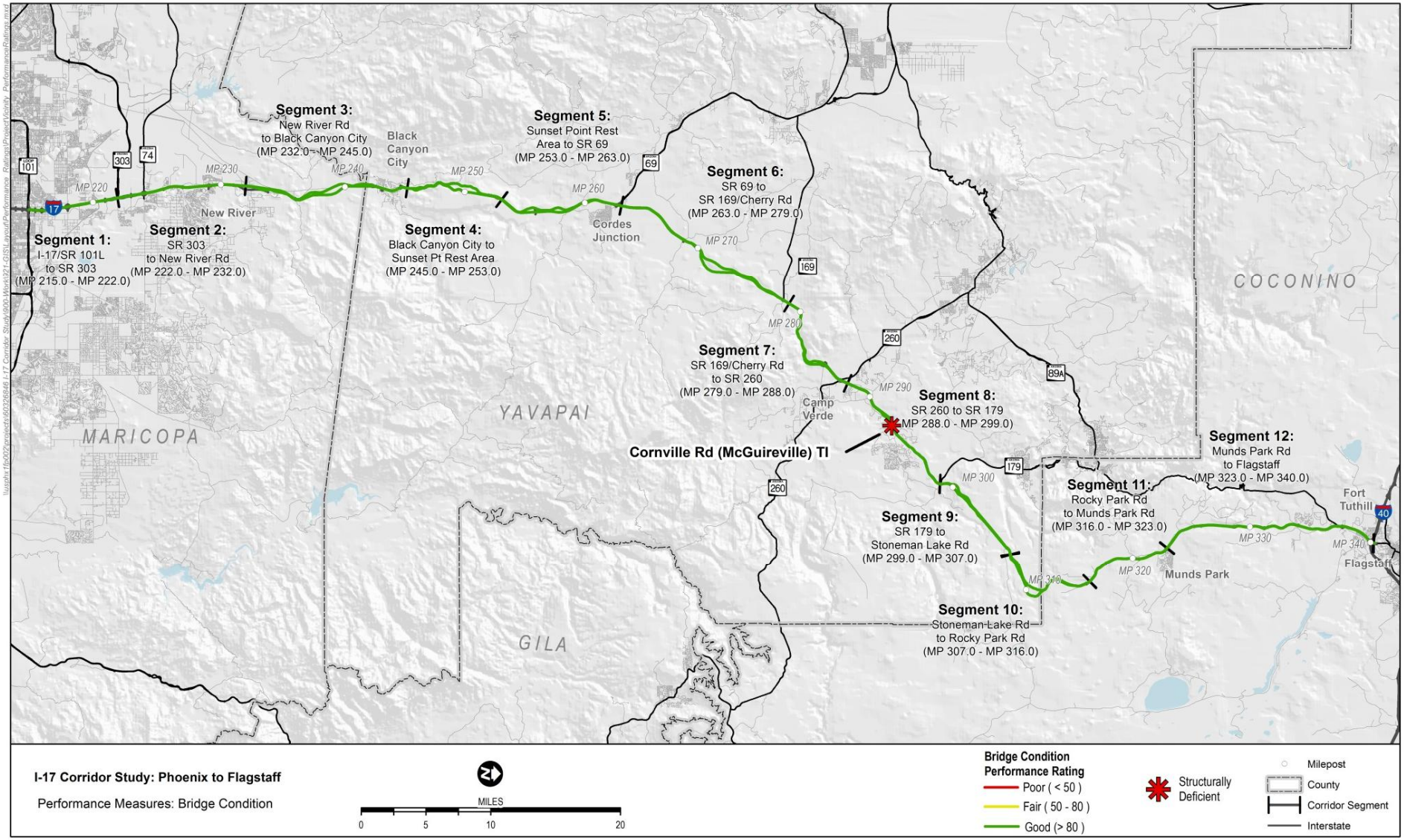
I-17 Segment	Bridge Index
1	7.49
2	7.54
3	7.10
4	6.34
5	8.05
6	6.88
7	7.01
8	6.71
9	6.67
10	7.25
11	7.68
12	6.45

ADOT Corridor Profile Studies (I-17, I-19, and I-40)
Bridge Index Sample



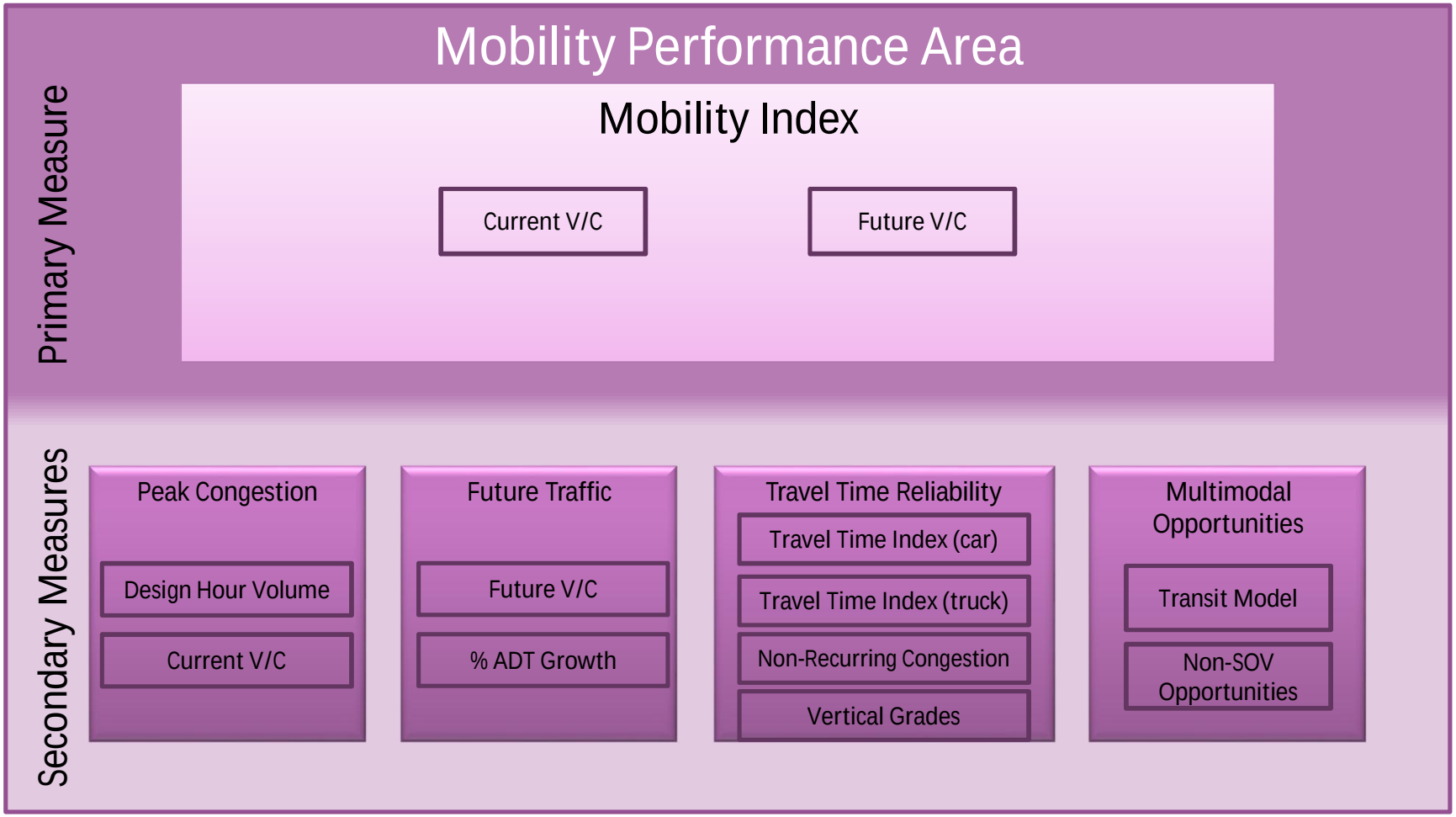
ADOT Corridor Profile Studies (I-17, I-19, and I-40)
Bridge Secondary Measure Sample

Bridge Condition Performance Rating



ADOT Corridor Profile Studies (I-17, I-19, and I-40)

Mobility Performance



ADOT Corridor Profile Studies (I-17, I-19, and I-40)

Mobility Performance

- Primary Measure: Considers both current and future traffic volumes compared to capacity
- Data Sources: HPMS (current) AZTDM2 (future)
- Data Update Schedule: Annual
- Calculation of Mobility Index: Average of Current and Future Volume to Capacity Ratio
- Resulting Mobility Index Score: Good/Fair/Poor based on Highway Capacity Manual, using Urban/Rural values for Level of Service
- Secondary Measures:
  - Peak Congestion
  - Future Traffic Volume
  - Travel Time Reliability (cars & trucks)
  - Multimodal Opportunities

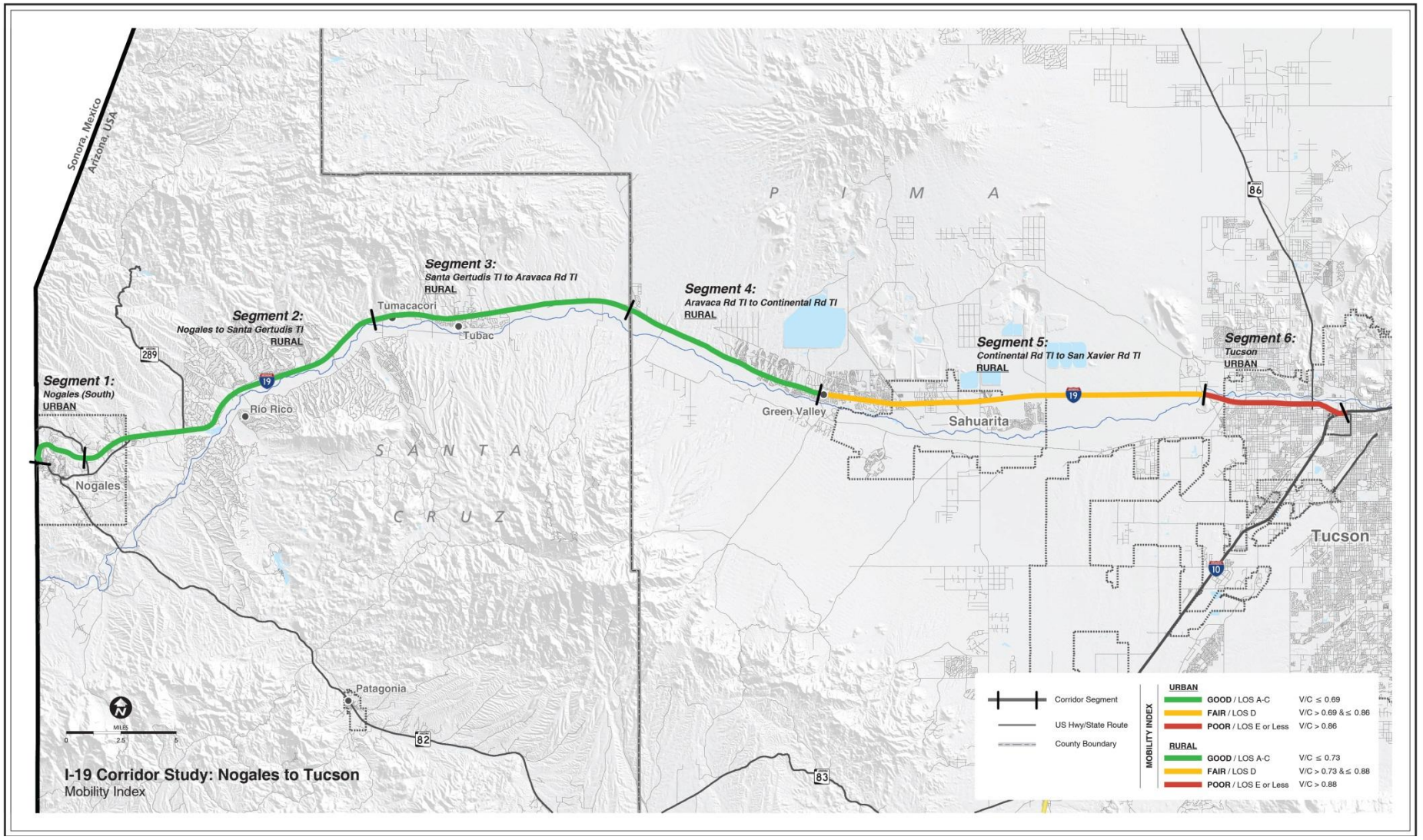
Segment	Mobility Index (MI)
19.1	0.15
19.2	0.41
19.3	0.34
19.4	0.43
19.5	0.74
19.6	0.86

Urban Mobility Index (UMI)	
Good	V/C ≤ 0.69
Fair	V/C 0.70 - 0.86
Poor	V/C > 0.86

Rural Mobility Index (RMI)	
Good	V/C ≤ 0.73
Fair	V/C 0.73 - 0.88
Poor	V/C > 0.88

ADOT Corridor Profile Studies (I-17, I-19, and I-40)

Mobility Performance - Mobility Index Sample



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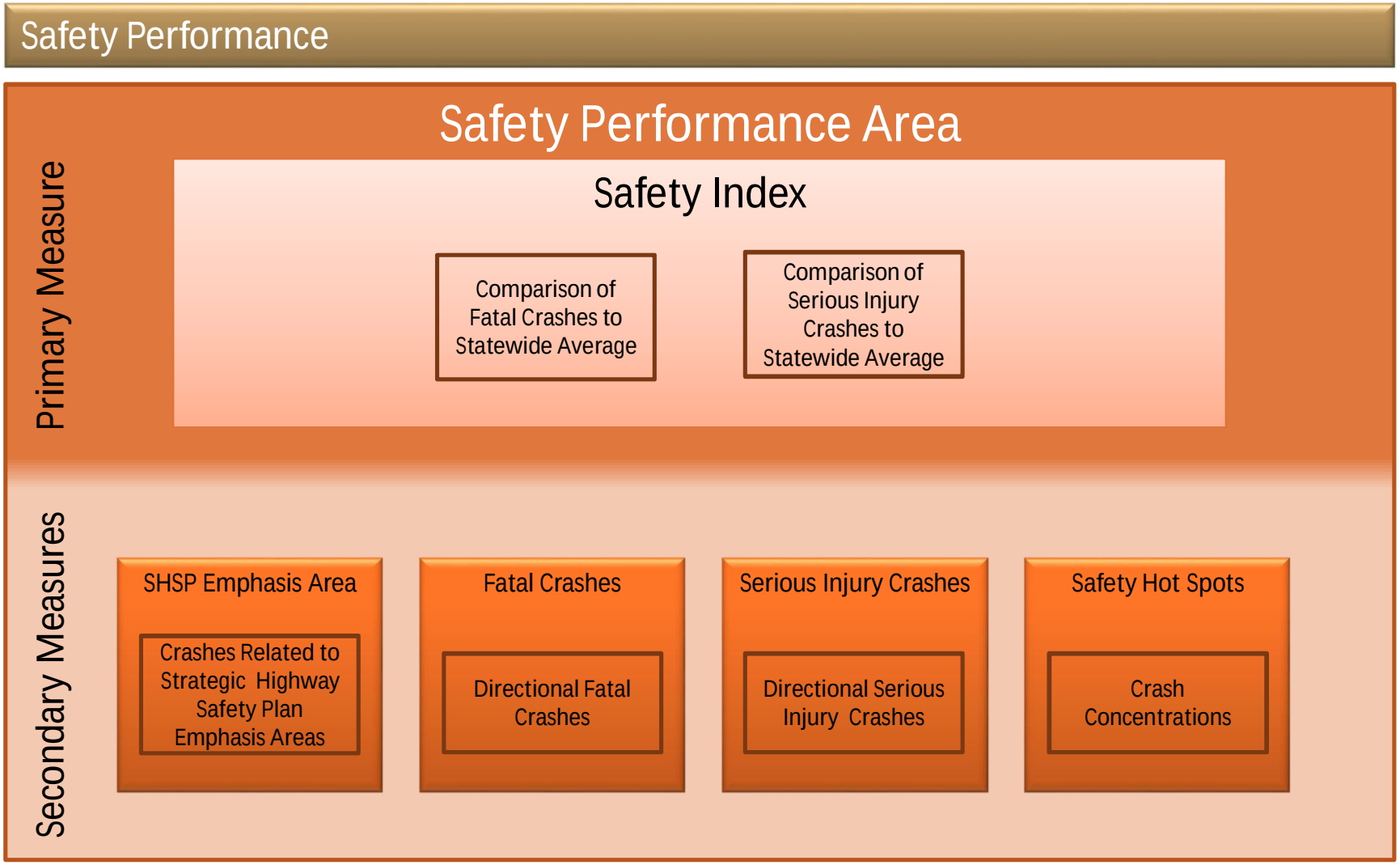


ADOT Corridor Profile Studies (I-17, I-19, and I-40)

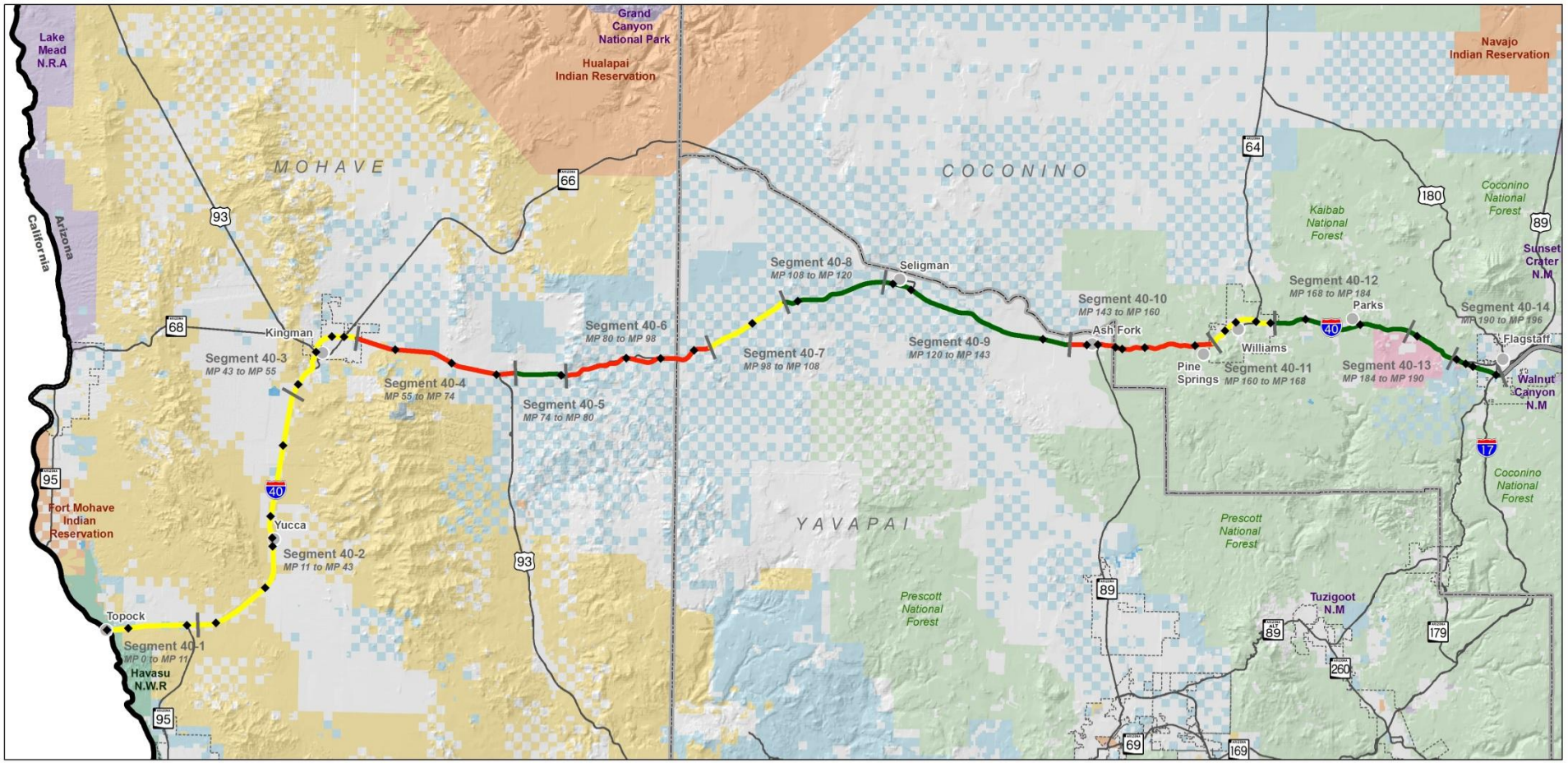
Safety Performance

- Primary Measure: focuses on two most severe types of crashes – consistent with FHWA/MAP-21 emphasis
  - *Fatal crashes* – economic cost of $5.8M/crash
  - *Serious injury crashes* – economic cost of $400K/crash
- Data Source: Most current 5 full calendar years of ADOT statewide crash database
- Data Update Schedule: Annually
- Calculation of Safety Index: Calculated frequency and rate indices for each segment and for similar statewide segments; Combined equally weighted frequency and rate; Normalized against statewide average for segment type
- Resulting Safety Index Score: Above Average/ Average/Below Average based on comparison to statewide average for segment type
- Secondary Measures: May help identify "hot spot" issues or how to improve safety in emphasis areas

Segment	Safety Index (SI)
Segment 40-1	0.82
Segment 40-2	1.07
Segment 40-3	1.08
Segment 40-4	0.67
Segment 40-5	1.64
Segment 40-6	0.69
Segment 40-7	0.89
Segment 40-8	4.17
Segment 40-9	1.58
Segment 40-10	0.50
Segment 40-11	1.13
Segment 40-12	3.21
Segment 40-13	1.92
Segment 40-14	3.03

Safety Index (SI)	
Below Average	< 0.75
Average	0.75-1.25
Above Average	> 1.25

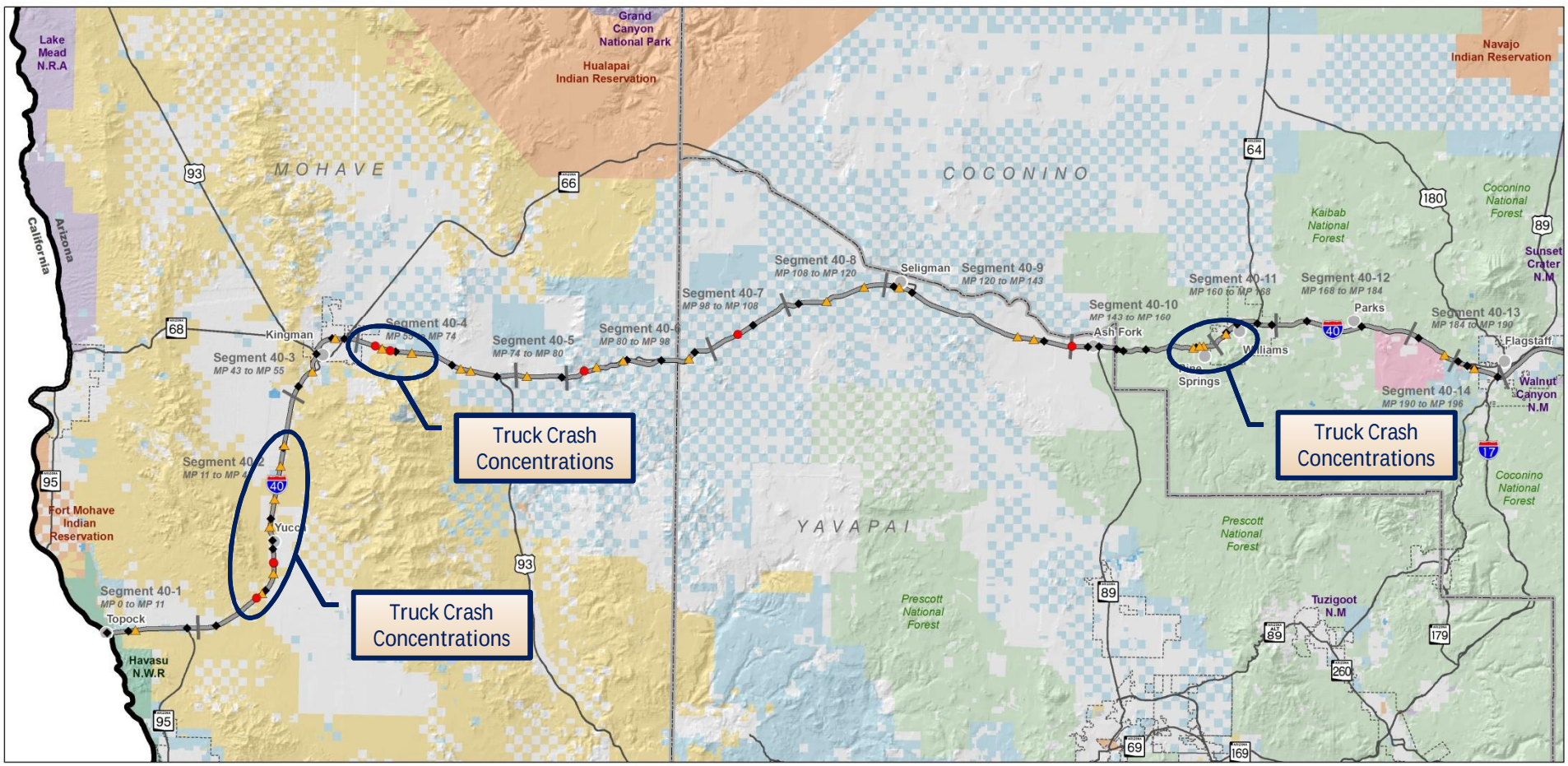
ADOT Corridor Profile Studies (I-17, I-19, and I-40)
Safety Index Sample



I-40 Corridor Study: MP 0 to MP 196
Safety Index (SI)

ADOT Corridor Profile Studies (I-17, I-19, and I-40)
Safety Secondary Measure Sample

Fatal and Serious Injury Truck Crashes



ADOT Corridor Profile Studies (I-17, I-19, and I-40)

Freight Performance

Freight Performance Area

Primary Measure

Freight Index

- Truck Planning Time Index
- Truck Travel Time Index

Secondary Measures

Truck Growth	Road Closure	Directional Travel	Truck Crashes	Truck Restrictions Hot Spots
% Truck Traffic Growth	HCRS Road Closures	Ratio of Directional Freight Index	Ratio of % Truck Related Crashes to % Trucks	Clearance & Load Restrictions

ADOT Corridor Profile Studies (I-17, I-19, and I-40)

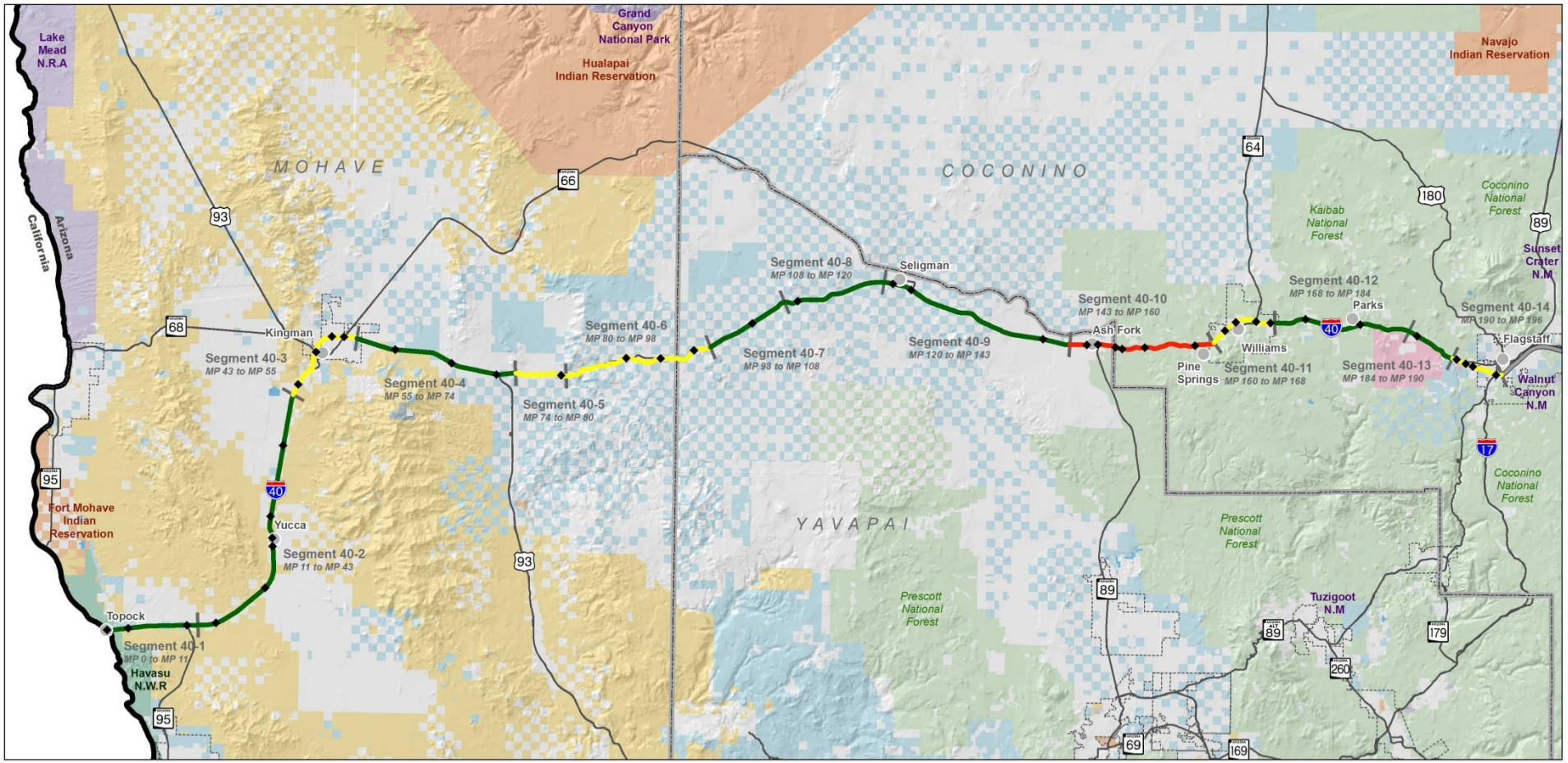
Freight Performance

- Primary Measure: focuses on two aspects of travel time reliability – a key measure in the freight industry
  - *Truck travel time index* (TTTI) – ratio of peak period to free-flow travel time [reflects typical peak period delay due to congestion]
  - *Truck planning time index* (TPTI) – ratio of total time needed for 95% on-time arrival to free-flow travel time [reflects extra buffer time needed]
- Data Sources: HERE truck travel time data derived from GPS in trucks
- Data Update Schedule: Updates available monthly through FHWA program
- Calculation of Freight Index: TTTI / TPTI
- Resulting Freight Index Score: Good/Fair/Poor based on ADOT Annual Performance Report thresholds
- Secondary Measures: May help identify "hot spot" issues or freight restrictions

Segment	Freight Index (FI) (TTTI/TPTI)
Segment 40-1	0.79
Segment 40-2	0.83
Segment 40-3	0.71
Segment 40-4	0.78
Segment 40-5	0.72
Segment 40-6	0.72
Segment 40-7	0.84
Segment 40-8	0.84
Segment 40-9	0.82
Segment 40-10	0.65
Segment 40-11	0.77
Segment 40-12	0.84
Segment 40-13	0.84
Segment 40-14	0.70

Freight Index (FI)	
Poor	< 0.67
Fair	0.67-0.77
Good	> 0.77

ADOT Corridor Profile Studies (I-17, I-19, and I-40)
Freight Index Sample



I-40 Corridor Study: MP 0 to MP 196
Freight Index (FI)

ADOT Corridor Profile Studies (I-17, I-19, and I-40)
Freight Secondary Measure Sample

Full Road Closure Frequency

I-40 Corridor Study: MP 0 to MP 196
Number of Full Closures Per Mile Per Year

ADOT Corridor Profile Studies (I-17, I-19, and I-40)

Next Steps

- Finalize performance index and secondary measures in consultation with appropriate ADOT groups
- Apply performance framework to all corridors and define baseline performance in Working Paper 2
- Establish performance targets in Working Paper 3 for use in defining performance-based needs

ADOT Corridor Profile Studies (I-17, I-19, and I-40)

Thank You

ADOT Corridor Profile Studies (I-17, I-19, I-40)
Technical Advisory Committee (TAC)
DRAFT Meeting Summary
September 16, 2014

1. Welcome and Introductions (ADOT)
    - Technical difficulties in setting up the webinar resulted in a delay in the start of the meeting to 1:30 pm.
    - Tazeen Dewan (ADOT) opened the meeting with self-introductions and a summary of accomplishments on the Corridor Profile Studies. The sign-in sheet and individuals participating by telephone are attached.
    - Each study has produced a Working Paper 1: Literature Review which has been distributed to the TAC for review. The deadline for written comments on Working Paper 1 is September 23, 2014.
    - A collaborative process involving ADOT MPD management, the ADOT project managers, and the consultant study teams has been used to develop a Performance Framework. Framework development is in-progress and will involve coordination with various ADOT groups to provide detailed information on performance measures and how each was calculated.

2. TAC Role and Responsibility (ADOT)
    - Tazeen Dewan (ADOT) presented the following roles and responsibilities for the TAC.
        - Assist in obtaining data and relevant information
        - Provide technical guidance, information, and response to issues
        - Assist the project teams with technical decisions
        - Maintain two-way communication with the study teams
    - Question/Comment: None
3. Corridor Profile Overview (ADOT)
    - Michael Kies (ADOT) presented an overview of the corridor profile study process and its relationship to the performance-based planning for the State's most strategic corridors and the Planning to Programming Linkage (P2P Link) study. The corridor profile studies will recommend strategic preservation, modernization, and expansion projects using a performance-based approach to corridor planning.
    - Question/Comment: None

4. Literature Review Overview (AECOM)
    - Rodney Bragg (AECOM) presented an overview of Working Paper 1: Literature Review. Each working paper summarized past improvements, programmed improvements, and improvement recommendations. Completed projects and corridor recommendations were mapped in each Working Paper.
    - The deadline for written TAC comments on Working Paper 1 is September 23, 2014.
    - Question/Comment: Was the effectiveness of past corridor investments evaluated? Response: The effectiveness of past investments was not evaluated.
5. Performance Framework Overview (KH)
    - Ted Ritschard (Kimley-Horn) presented an overview of the Performance Framework. Key definitions were presented along with a diagram of the Framework for a performance-based corridor analysis process in the context of identifying needs, solution sets, and recommending strategic investments as candidates for the P2P Link programming process.
    - Question/Comment: Several questions were asked to clarify terminology and definitions. Others asked about the performance measures that would be used for primary and secondary measures. Response: The presentations for each of the performance areas will include working definitions of primary and secondary performance measures.
    - Question/Comment: Will the performance measures be used to evaluate past performance and performance trends. Response: ADOT is in the early stages of performance-based planning and programming and will focus its efforts on system and corridor performance going forward.
    - Question/Comment: Will performance measures differentiate between urban and rural operating environments which have distinctly different performance metrics. Response: Urban and rural performance differences have been considered during the development of performance measures for mobility, safety, and freight performance areas.
    - Question/Comment: The term “strategic initiative” needs to be included in definitions for performance-based planning and programming. Response: This will be discussed at the next Consultant Coordination Team meeting.

    Pavement Index (AECOM)
    - Rodney Bragg (AECOM) presented the primary and secondary performance measures for the pavement performance area including data inputs and calculations for the Pavement Index. Sample maps for the Pavement Index and the Directional Pavement Serviceability Rating (secondary measure) were presented.

- Question/Comment: There was support for using maintenance records as a secondary measure for the pavement performance area.

Bridge Index (AECOM)

- Rodney Bragg (AECOM) presented the primary and secondary performance measures for the bridge performance area including data inputs and calculations for the Bridge Index. Sample maps for the Bridge Index and the Bridge Condition Performance Rating (secondary measure) were presented.
- Question/Comment: There was support for using maintenance records as a secondary measure for the bridge performance area.

Mobility Index (URS)

- Dale Wiggins (URS) presented the primary and secondary performance measures for the mobility performance area including data inputs and calculations for the Mobility Index. A sample map for the Mobility Index was presented.
- Question/Comment: Concern was expressed about missing critical performance issues that could get washed out in the primary measures and performance index. Response: It was clarified that the secondary measures would be applied to each corridor segment to ensure that performance issues beyond the primary measures are identified.

Safety Index (KH)

- Dave Perkins (Kimley-Horn) presented the primary and secondary performance measures for the safety performance area including data inputs and calculations for the Safety Index. Sample maps for the Safety Index and the Fatal and Serious Injury Truck Crashes (secondary measure) were presented.
- Question/Comment: The scale for the Safety Index needs to have mathematical rationale. Response: Several scales were considered including tertiling. Kimley-Horn will schedule a meeting with Daniel Brilliant (ADOT) to discuss scaling rationale.

Freight Index (KH)

- Dave Perkins (Kimley-Horn) presented the primary and secondary performance measures for the freight performance area including data inputs and calculations for the Freight Reliability Index. Sample maps for the Freight Index and the Full Road Closure Frequency (secondary measure) were presented.

- Question/Comment: Concern was expressed about combining PTI and TTI. TTI may be a more favorable performance measure. Response: Kimley-Horn will schedule a meeting with Michael DeMers (ADOT) to discuss the way in which PTI and TTI were combined. Kimley-Horn will also schedule a meeting with Daniel Brilliant (ADOT) who was involved in developing PTI and TTI system performance measures for the ADOT System Performance Report for 2013.

6. Next Steps (KH)
    - Dave Perkins (Kimley-Horn) presented the following next steps:
        - Finalize performance index and secondary measures in consultation with ADOT groups
        - Apply performance framework to all corridors and define baseline performance
        - Establish performance targets for use in defining performance-based needs
    - Question/Comment: Daniel Brilliant (ADOT) would like to meet with each consultant team to more fully understand data analysis and assumptions. Response: The consultant teams will discuss how best to coordinate with Daniel in the weeks ahead.
    - Question/Comment: When will the next TAC meeting be held? Response: TAC meetings will be held at key milestones of the study such as today's meeting to present the performance framework and receive TAC comments. The next TAC meeting has not been scheduled but may be conducted to present performance-based corridor needs.
7. Adjourn

Corridor Profile Studies – Technical Advisory Committee Meeting 1

Meeting Attendance Sign-in

Date: September 16, 2014 Time 1:00 PM

Location: ADOT Board Room

Name	Organization	Telephone	Address	Email
Charla Glendening	ADOT	602-712-7376	206 S. 17th Ave	cglendening@azdot.gov
Richard Weeks	ADOT	4382	1615 W. Jackson	rweeks@azdot.gov
David Benton	ADOT Bridge	602-712 7910	205 S. 17th Ave	dbenton@azdot.gov
Michael Gorton	ADOT	602 712 6466	206 S 17th Ave	mgorton@azdot.gov
Jonathan Bates	ADOT	3266		JBates@azdot.gov
Asad Karim	ADOT	x6799		akarim@azdot.gov
Daniel Brilliant	ADOT			
Sharon Gordon	FHWA	602 382.8972		SGordon@dot.gov

Corridor Profile Studies – Technical Advisory Committee Meeting 1

Meeting Attendance Sign-in

Date: September 16, 2014 Time 1:00 PM

Location: ADOT Board Room

Name	Organization	Telephone	Address	Email
John Hoang	ADOT TTG	602 712 6622	2302 W. Durango St Phx AZ 85009	Jhoang@AZDOT.GOV
John Dickson	ADOT - SPMG	602 712-8683	205 S. 17th Ave MD 614E Phx Az 85007	Jdickson@azdot.gov
MAFIZ MAN	ADOT-MATERIAL	712-4061	1221 ~~S~~ 21st Ave Phx	MMIAN@AZDOT.GOV
Kevin Robertson	ADOT Materials	712-7171	1221 21st Ave Phx	Krobertson2@azdot.gov
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Romare Truely	"	602 3828978	"	romare.truely@dot.gov
Tom Deitering	"	602 382 8971	"	tomd.deiteringa@dot.gov

Corridor Profile Studies – Technical Advisory Committee Meeting 1

Meeting Attendance Sign-in

Date: September 16, 2014 Time 1:00 PM Location: ADOT Board Room

Name	Organization	Telephone	Address	Email
Craig Raborn (by phone)	WACOG			
Nate Reisner (by phone)	ADOT Flagstaff District			
Kara Lavertue (by phone)	ADOT Kingman District			
Tony Staffaroni (by phone)	ADOT Communications			
John Liosatos (by phone)	PAG			
Robin Raine (by phone)	ADOT Urban Project Management (Tucson)			
Raul Amavisca (by phone)	ADOT Technology Group			
Brent Crowther (by phone)	Kimley-Horn			